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EDITORIAL NOTES.

The Closing Scenes.

ACTIVITY reigns in the coalfields. Collieries which have not yet recommenced operations are making the necessary preparations to do so. Miners who have been idling about for nearly seven months of a precious year are looking forward to terminating the period of waste, wages loss, misery, and privation imposed upon them by men in whom they had put their trust, but whose ambitions were purely political, and the power with which they were invested by the miners merely the vehicle by which they sought to attain their ends—ends of no value to the miners. It is hoped that now the latter have been disillusioned, or at any rate the majority of them (because Cook and Smith have a little following of men who hope to realize a new state through promoting chaos and destruction), they will deal with the principal leaders as they deserve to be, and have no more of their insane folly. Small wonder that, with "Failure" written large against their schemes and manœuvres of the past weary months, the impossible Cook is shrieking with rage over the ignominious defeat which he and his like, and their hollow policy, have suffered. However, now that these men have been crumpled-up by the circumstances which they themselves have been largely instrumental in creating, and their dreams of bringing about nationalization have been dispelled, it is only fair to acknowledge the staunch attitude throughout the piece of the colliery owners in seeking to bring about (through the opportunity afforded by the persistent folly of the Miners' Federation) a new order of things which will largely help to defend the country and the industry from a repetition of this costly experience—costly not only to the coal industry and the miners, but to the nation and its industries generally. It is hoped that within a few days the whole of the coalfields will be again in as full swing as circumstances warrant and require.

As the position was left a week ago, the Government had had assurance from the representatives of the Miners' Federation that, in agreeing to the making of district settlements, authority had been given to the Executive to include hours as well as wages. But subsequently the Premier was informed that the Executive were not empowered to commit any district to longer hours. Naturally the Government were incensed at this, as reference of the matter to the district delegates meant further delay. Thereupon, the Government took a firm stand, and intimated that they would not proceed until they had complete assurance that it was agreed that both hours and wages should be brought within the district agreements. This illustrates the circumrotary methods that have been adopted by the Federation from the outset. Representatives have had no power to commit the Executive without reference to them; the Executive would not move without the authority of the district delegates; and the delegates were impotent without reference to the districts. So each time the cycle of procedure has been adopted as a valuable aid to gaining time for consideration, and formulating objections. But on this occasion, the Government held the position; and the delegates on Saturday saw fit by a majority of 80,000 votes out of a total of 800,000, to accept the terms laid before them by the Government, which have now been submitted to the districts for their verdict. This will be available for a delegate meeting to be held in London on Friday; and then, it is hoped, there will be an ultimate calling-off of the strike, and a resumption of work. In considering the vote alluded to above, it should be remembered that the voting figures have no relation to actuality, inasmuch as they include the membership represented by the men who have returned to work.

The memorandum embodying the terms proposed by the Government was issued on Friday night. The principal features of it are district settlements, which will involve hours and wages; standard district agreements for a period of not less than three years; an undertaking by the Government to introduce legislation by which any district agreement other than a standard agreement may, if on the basis of longer working hours than operated in a district in April last, be made the subject of appeal by either party to the National Arbitral Authority; and the ratio of the division of net profits to range between 87 to wages and 13 to profits and 85 to wages and 15 to profits. In this scheme, away goes everything for which the extremists of the Federation have been fighting—political motives, slogan, and all else, including the power of the Federation. Through the scheme there is a good chance of gradually establishing the industry on a sounder foundation than that on which it has stood the last five years, during which it has been subjected to a national agreement, and to the ruinous disturbances created by the political wirepullers on the Council of the Miners' Federation. These men are fuming to-day at the complete failure of their subversive plans; the trade union world is bemoaning a state of affairs which has wasted its power, prestige, and finances, and diminished the scope of employment for long to come. What has taken years to build up has been squandered in a few months. The heavy national loss is deplored. The only consolation is that what has been happening has cleared the air, and has been instrumental in bringing to earth again many men who had soared well into the impracticable. The colliery owners are not altogether pleased with the Government terms. There is a little quarrel over the question as to whether the owners really gave the Government to understand that their views were in harmony. They also object to the National Arbitral Authority, which is only to operate for six months, and then not without being called upon to settle a difference. We rather fancy there will be little disposition on either side to have recourse to the authority. If this is a correct assumption, then the position is one which is absolutely next door to as complete autonomy in each district as could be devised. We hope a new and happier life is about to commence in the coal industry. At the initial stage, there will be rocks and shoals to be negotiated; but, with goodwill and earnest effort on both sides, these should be overcome.

The Contest with Corrosion.

In concluding his paper on "Some Phases of Corrosion," at the meeting of the Southern Association last Friday, Mr. R. H. Ruthven, of Ramsgate, remarked that "if our modest experiences have been of interest to you, my object has been achieved." We believe that those experiences will not only interest other gas engineers, but will have to their undertakings a value of an order which will remove the experiences from the category of "modest." In industry, we usually judge of the worth of a thing by its effects; and if the experiences at Ramsgate produce like effects elsewhere (and we see no reason why they should not), then, although we cannot definitely appraise their value, we know that it will in the aggregate be enormous. Corrosion is a subject of vital importance to gas-works where so much iron and steel are used, and where the conditions give full play to this form of deterioration. We have to deal with external corrosion of structures which are exposed to the influences of the atmosphere. We have internal corrosion, owing to the presence in the gas of carbon dioxide, oxygen, and moisture; and underground we have the influence of salts in the soil, which, in certain circumstances, form a good electrolyte. Corrosion is already an active force in producing depreciation on gas-works; but Mr. Ruthven drives home his appeal for the use of every possible means of defeating the ravages of the insidious enemy by stating that, unless this be done, it will represent an increasingly heavy item of expenditure which no engineer who is worthy of the name can desire.

In considering the prevention of corrosion, the first thing that should have the closest study is design; and this particularly applies to gasholders. Several instances have been seen where, at the junctions of members, the design is such that they supply harbourage for water, and do not allow visits from the paint-brush, or other form of protection to be given. That is an important point which claims strict attention in design. As Mr. Ruthven truly holds, in making the plea for simplicity of design, if a structure is worth erecting, then it is worth preserving; and the design must be such as to enable this to be done. But there are exposed parts other than the junctions of the various members in a structure. The sheets of gasholders are liable to sad deterioration; and here we have an experience which will no doubt prove highly valuable. At Ramsgate there are two holders of 1¼ million c.ft. capacity, which were suffering from corrosion externally at a rapid rate. A sample of the water in one of the holder tanks was sent to Prof. Cobb for examination; and his report showed that the liquor, among other things, contained cyanides in an actively corrosive form—mainly, ammonium cyanide—and that the corrosion was likely to continue. This meant action on Mr. Ruthven's part. From No. 1 holder, the paint was thoroughly removed; and then the sheets were given two coats of paint which was allowed to harden before immersion in the tank water. But when the plates had been in the tank water, and were again exposed, it was found that tiny points of blue had formed on them. Undaunted, Mr. Ruthven determined to find another means of conquest. He had in stock about 250 gallons of heavy paraffin distillate; and he poured this on the surface of the water in the tank. The affected plates were lowered through the oil film; and, on raising the holder again, it was found that all traces of the blue spots had disappeared. This was in the spring of 1923; and the lower lift of the holder has not required attention since. Without painting, the oil film was applied to No. 2 holder; and the only protection the two lower lifts have had, also since 1923, has been the oil film. There is something conclusive about this experience. A layer of oil has also been introduced on the surface of the water inside the tanks, in the hope that the good work on the external surface would be reproduced on the internal surface of the sheets. The only explanation Mr. Ruthven can give for the oil film having such a marked effect is that it acts as an insulator—much in the same way as we imagine the Botley and other processes do in coating the inside of mains with the atomized or vaporized oil injected into the gas—originally for the purpose of minimizing naphthalene troubles.

The second experience deals with the graphitization of mains; and there is warning in this not to lay mains through wet clay without affording them some protection. Finding softening of pipes occurring in places where they passed through wet clay, while there was no change in the nature of the pipes laid through chalk, Mr. Ruthven submitted a sample of the clay to Prof. Cobb, whose tests showed that the clay was one which, when subjected to the action of water, yields a distinctly acid solution such as would be expected to attack cast-iron pipes. The means adopted by Mr. Ruthven when laying new pipes in places where there is wet clay is to ram chalk well round the pipes; but not all districts are favoured as he is with an abundant supply of chalk. But he suggests as an alternative that, if cast-iron pipes were given a wrapping of jute, and treated exactly like steel pipes, sufficient protection would be afforded. Regarding the internal corrosion of pipes, the author of the paper asks whether it would not be worth while to put the gas into such a condition of moisture content that liquid water would not condense out at the lowest temperature to which the gas would fall. If this could be done economically, he is confident that internal corrosion troubles would be greatly reduced, if not entirely removed. Several investigators have their eyes on this subject of the drying of gas; and it is well worth the fullest exploration. The Botley, or like, process is the existing alternative.

We end as we began, by commending the paper by Mr. Ruthven for its value in relation to a subject which has not had in the gas industry the close attention it deserves—more especially in these days when iron and steel structures in gas-works are a growing quantity. The subjugation of corrosion represents an economy of no mean character. The paper and discussion will be published *in extenso* in our next issue.

Low-Temperature Carbonization and the Gas Industry.

We do not think that really sentient men associated with the development of low-temperature systems of carbonization entertain any belief that, in present circumstances, such systems could displace current practices in gas-works. The utmost they suggest is that they might be found valuable as auxiliary processes; but, so far, gas engineers have not found sufficient enticement to place them even in a secondary position in their manufacturing practices. What may come is another matter. Gas is our industry's primary requirement; and the primary requirement of the nation from the industry. With the country equipped as it generally is with gas cookers, with an ever-increasing number of gas fires and other appliances in which gas is employed as a heating agent with labour-saving properties, no low-temperature system could have enabled the community to hold out as it has during the long coal stoppage on such an economical expenditure of fuel; and in this regard electricity could be coupled with low-temperature carbonization. In the paper that Dr. E. W. Smith presented to the Southern Association last Friday, he examined the low-temperature process in relation to the needs of the gas industry; and his main point is that, until it can be shown that the low-temperature process, installed as an auxiliary to normal gas-works practice, would result in the cost per gas therm being reduced, the system cannot be adopted. We can conceive of circumstances in which such an effect could be shown; but what to us is a more troublesome aspect of the matter is that the cost of the gas therm by the low-temperature system is subject to so many commercial factors which are constantly varying that, from the standpoint of to-day, we see little chance of realizing by it that approximate permanence of cost per gas therm which is necessary to the gas industry and its public service. The time may come when there will be a world shortage of oil and motor spirit, and when their values will make permanent ascent. Then our outlook may be changed considerably. Low-temperature carbonization from that point of view may become a national necessity. No one can tell. Should it become so, the gas industry will have to consider very seriously whether or not it shall take part in the development of a process of coal carbonization which will yield more oil and motor spirit, or whether it shall be developed as a separate industry. It is just as

well to steer a middle course in opinion, if not in practice, at the present time. Half-a-century ago the gas industry of this country might perhaps have become the sole supplier of light, heat, and power, had it been sufficiently enlightened to grasp the opportunity. Half-a-century hence, our successors may be wondering what possessed those of the present generation to allow low-temperature carbonization to be developed outside the gas industry. We cannot tell what will happen. Our attitude must be that of the open mind—while almost unanimous in the view that at present there is nothing in the system which would justify its incorporation in the gas industry, even on the ground of a slender expediency. But that does not for ever bar the door against reconsideration in new circumstances.

Where Are the Students?

THAT the Education Scheme in the gas industry is not making better headway is undoubtedly due to the fact that, while there is no dearth of suitable young men, there is of actual students for the technical colleges and schools. There are some responsible men in the industry who state that, if the facilities were provided, there would be more students; but they surely do not expect that technical colleges and schools can go to the expense of arranging for the necessary means and equipment for classes in Gas Engineering and Gas Supply if there is not an adequate promise of students to justify making the provision. That the absence of co-operation by many technical colleges and schools is due to the paucity of students, and not to any unwillingness on the part of the former to extend their operations if they are encouraged, is the reason for the condition of things in connection with educational facilities which was recognized by the report of the Institution Education Advisory Committee published in the "JOURNAL" for Sept. 29, p. 785. The Committee remarked:

> It is rather disappointing to find that thirteen of the colleges having approved courses have no students sufficiently advanced to take the examinations this year, and that two others have been unable to run classes this session in either Gas Engineering or Gas Supply, owing to lack of students. Serious as this is in itself, it becomes still more so when we consider how very few technical colleges throughout the country have approved courses. . . . The reason is, of course, the absence of students. The Board of Education and many local authorities are very willing to arrange classes if students are forthcoming.

This statement has general application; and it has confirmation, so far as the Midlands are concerned, by recent experiences of Mr. Harry Clark, the Distribution Superintendent of the Derby Gas Light and Coke Company. The Midlands of all areas—with large gas undertakings, and many of them—we should have imagined, would have provided such a number of students in Gas Engineering and Gas Supply as to have made it well worth while the technical colleges and schools establishing the necessary classes and courses. But it is not so. In conversation, we gather from Mr. Clark that he desired to find a college where a student in gas supply could attend to obtain essential technical instruction. His quest disclosed a curious state of things. Not being able to obtain at the Derby Technical College what was wanted, he turned to Nottingham University College, only to learn that it has been decided not to hold a course in Gas Supply during the present session; and the reason regretfully advanced in both cases is that there are insufficient students to warrant it. He turned to Leicester; and the Principal of the College of Technology there told him that it was astonishing not to find any apparent demand by the younger members of the gas industry for suitable technical instruction in their work. When the time is ripe, he is prepared to take further action. Application to Loughborough College elicited the fact that an endeavour was made two years ago to organize classes in Gas Supply; but, the demand not being sufficient to justify the expenditure, they were forced to abandon the scheme. Finally, there was application to the Halifax Gas College; as an external student.

That is the position; it is both deplorable and amazing. It shows a widespread apathy; a neglect of responsibility on the part of those who have influence over the entrants to the gas industry. It indicates, too, that in the crowds of aspirants for position in the industry, there are comparatively few who are sufficiently ambitious to desire to equip themselves intellectually to fit them for the work that lies ahead. We had hoped that before this there would have been seen a universal desire and active movement, on the part of both employers and the young men of the industry, to uplift the standard of training. It is strange that we should meet apparent apathy on the one hand, while, on the other, there has been a remarkable growth of appreciation that the modern internal conditions of the industry, and its new environment—with competition assailing at every point, and progressing in keenness—mean that the best talent the industry can produce must be brought to bear upon the defence and promotion of its interests. This applies not only to the industry as a whole, but to the individual undertaking. The men upon whom executive responsibility will rest in the future stand first in importance. Their training must therefore be thorough, and equal to the demands which will be made upon them. If we appreciate all this, then why is it that it is the absence of students which prevents the planting of the necessary educational facilities in such convenient centres as Nottingham, Leicester, and Loughborough? It seems to us that something in the nature of a special campaign is required to cause an awakening, and to bring about the provision of students to justify the technical colleges taking a greater interest in our industry. Concerning the Midlands, just think of the counties of Derbyshire, Nottinghamshire, and Lincolnshire producing this year only one applicant for educational facilities in Gas Engineering and Gas Supply. We suggest that this is a matter in which the Midland Association of Gas Engineers and Managers should lead the way, through conference and discussion, to see what can be done to stimulate the supply of students. It is no use making a pious declaration concerning this particular need of the industry, and then to sit with folded arms, and do nothing. The work and responsibilities of the present are heavy; they will be heavier in the not distant future. Then let the industry do all it can to develop latent ability along the best possible lines. To do this there must be educational facilities, and students to take advantage of them. See that they come along, and that the tide is maintained.

Any helpful suggestions will be welcomed in our "Correspondence" columns.

The Lighting Load—A Suggestion.

THERE are two views in the gas industry at the present time regarding the lighting load. There are those who believe that we shall gradually be deprived of it; there are those whose faith is so robust that they are of the contrary opinion, and assert that loss is largely due to negligence. We are with the latter. In connection with the question of loss or retention, there are four things to combat: Public ignorance of the virtues of modern gas lighting; the setting of fashion before important qualities; relative convenience; and the large extent of municipal ownership of electricity supply in the country. Some of these aspects of the lighting problem were referred to in the valuable paper which Mr. Frederick J. Gould, the Chairman of the Council of the Society of British Gas Industries, read at the autumn meeting, over which Viscount Ednam presided. The contribution is valuable because it is a compendium of information respecting lighting matters, and embedded in it are suggestions to which it would be well that there should be universal heed in the industry. It may be thought by some that it was a curious subject to bring before a Society of manufacturers of gas plant and gas-consuming appliances. On the contrary, it is a most appropriate subject, and not only because the Society possess a Lighting Section, but because every member—be he maker of gas-producing plant or gas-using appliances—knows it is gas consumption that is fundamental to his business, and the lighting load is not the least important element in that consumption.

Much of Mr. Gould's communication is historical; and the history of gas lighting is fascinating and romantic. We make ½ c.ft. of gas do to-day what 5 c.ft. did in the old times, and much better than that with high-pressure and superheated cluster burners. That in itself discloses remarkable progress; and yet lighting is the most vulnerable part of our multi-sided business, and has been the easiest for the inroads of competitors. Towards the end

of his paper, Mr. Gould says that, if the lighting business is worth holding, then it is worth while taking steps to defend it. He also suggests that a rousing campaign on this issue alone would result in a full harvest. It is well to ascertain what are the components of the case (as reflected in the paper) upon which a lighting campaign could be based. In the first place, it can be shown that gas lighting, with modern burners, is economical and efficient. That is a point with which every gas man whose knowledge is up-to-date can readily deal. We have spoken of the ignorance of the public regarding the virtues of gas lighting compared with those of the competitor. We do not appreciate why it is, but there appears to be a singular hesitation in the gas industry to educate, thoroughly and deliberately, the public up to the inherent merits of modern gas lighting. There is nothing of which to be ashamed in doing this. It is as perfectly legitimate to do it with gas as it is to proclaim the merits of other commodities. How many of the public know of the intrinsic brilliancy of the competing lights? How many of them are aware that the larger the area of the source of a given quantity of illumination, the better it is for the eyesight? How many know that in this respect the area of an incandescent mantle for a given illumination is many times the aggregate area of the hair-like filaments used in an electric bulb? If only the few know these things, then the many should be taught them. They should also be taught more regarding the spectra of light, and how it is that the spectrum of a light has an important bearing upon its quality. From the health standpoint, too, there is the indisputable fact that gas lights can perform the dual functions of providing illumination and promoting ventilation and hygienic conditions. The latter is a secondary property of gas which has been little studied by the public; and we have in it a valuable means of doing beneficial educational work. If more was made of these matters, they would be a good set-off to any craze that exists as to electric lighting being "fashionable." A good deal of the idea that the one illuminating agent is more "fashionable" than the other is due to neglect of local educational work on the part of gas undertakings; it is due also to the apathy of many in another matter upon which Mr. Gould touches, and that is maintenance. Grotesque, ugly, defective, and inefficient is the lighting equipment which exists—not in isolated cases, but in many. All such equipment wants clearing out, together with the extermination of the cheap rubbishy burners, mantles, and fittings which are imported from abroad, and are marketed at low prices, although dear in running cost to the consumers through their inefficiency. Such existence makes easy the way of the competitor. In attacking, then, the question of the defence of the lighting load, let maintenance and eviction of the inefficient be considerations of foremost order. The best gas lighting equipment—through economy, efficiency, and good quality lighting—pays the consumer well in the long-run, and so is cheap.

There is the point of convenience in lighting and extinguishing; but convenience intrinsically is a poor set-off to good quality of light and the promotion of healthful conditions. The majority of people, however, do not realize this, simply because they have not been taught the facts of the matter. Convenience is something which can be realized without the knowledge which is necessary to appreciate unseen, but nevertheless genuine, merits. It is clear that Mr. Gould finds the present methods of lighting and extinguishing inverted burners not as satisfactory as could be desired; and this brings us to a point upon which serious research should be made. It has been suggested by Mr. T. P. Ridley that, if some improvement of distant control could be invented without the aid of the by-pass, it would be a great help to gas lighting. This, of course, has been a subject of research from time to time over at least the past quarter of a century; and both electric and platinum-sponge lighters have been introduced—with great promise from the inventors, in practice unfulfilled. The conditions under which such lighters are used soon make their vital part a victim of temperature or oxidation; and, so far, there has been consistent failure. Nevertheless, hope of realizing eventual success need not be relinquished. It is a matter of supreme importance to gas lighting; but it is no use putting anything on to the market which is unreliable and demands frequent attention. There is nothing more annoying and damaging than refusal to act when required. We see from the annual report of the Council of the Society that they are convinced as to the desirability of nothing being left undone which can be done to bring a pilot-free lighting device into existence. But they are rightly of opinion that this is a matter rather for the chemist than for the mechanical engineer, and so are approaching the Leeds University to see whether research can be made in this direction.

In connection with street lighting, too, Mr. Gould points to the directions in which there should be attempts to secure further advance. In the first place, he remarks upon the fact that gas is still the principal illuminant in our streets, and that there is nothing better from the point of view of efficiency and cheapness. With that we agree; but we cannot shut our eyes to the fact that electricity is making inroads into street lighting by gas—not on the ground of merit, but for other reasons. In the first place, gas has (not only in street lighting, but in housing schemes) to contend with the fact that, in the majority of cities and towns the electricity supply is under municipal ownership; and, in the second place, from wide observation, we are convinced that not in all places have those responsible for gas undertakings learned how to prove to local authorities that the gas industry has by no means stood still in lighting—that higher street lighting efficiencies can be obtained without any great initial cost by modernization, and certainly without increasing the running expenses. Mr. Gould makes a plea for a broader study of this matter, and also for more attention being given to street lantern design, with the view of securing better polar curves. He notices that our electrical friends have been concentrating on the problem of how to decrease the diversity factor in illumination, and remarks that the gas industry must get down to this and other problems if they are to maintain their supremacy in the lighting of our streets. He points out that the new type of street lamps, with reflecting mirrors set at scientific angles, which prevent glare, and give the fullest possible diffusion of light, are economical and efficient—marking another step in progress in this service. Generally, in connection with gas lighting, Mr. Gould makes a strong plea for standardization in expressing efficiency ratings—his suggestion being that such efficiencies should be stated in terms of B.Th.U. per candle-power-hour, mean hemispherical rating. He is also favourable to the standardizing of reflector design.

It will be seen from the foregoing that, in the view of Mr. Gould, as an expert in lighting matters, there is a considerable amount of work which can be done, and ought to be done, by the gas industry in the protection and promotion of its lighting load. Hence his suggestion that there should be a rousing gas-lighting campaign throughout the country; but no use would be served in starting it until there has been a careful review of the whole ground. We have sufficient faith that, if such a campaign were undertaken seriously on an educational plane, the erosion of our lighting load would largely cease, and, on balance, we should be able to record good progress.

The Institution Examinations.

We have received from Mr. Walter Hole, the Organizing Secretary of the Institution Education Scheme, the final list (with one exception) of successes in the examinations last May. There has been some delay in issuing this; and Mr. Hole (it will be seen on a later page) explains the reason. Of course, delay of the kind is inconvenient and regrettable; but, in this instance, it was unavoidable. However, we hope that the Committee will, as they anticipate, be able to obviate the possibility of such delay occurring in future, as it is rather discouraging to candidates to have to wait months before learning their fortune in the examinations.

It is satisfactory to observe, in the report of the Examiners in "Gas Engineering," that there were, in the work of the candidates, signs of great improvement over that of previous years. In the Diploma Grade, the number of candidates (seven) is regarded as encouraging; but we are not so interested in the number as in the extremely

pleasing remark of the Examiners that the theses were consistently good, and the written and oral examination results were gratifying. They remark that "the type of man coming forward for this stage is particularly good, and promises well for the future of the industry." Remarking on the work in the Higher Grade, they are also able to record improvement over the two previous years; but they state that there is still a tendency, both in this grade and in the Ordinary, to side-track sketches where they are expressly asked for. This is regrettable; and the Examiners must certainly insist that evidence shall be given, as they desire, that the candidates are able to make a precise and reasonable sketch. A notable impression of the Assessor is the great difference in the quality of the papers in the Ordinary Grade by the students representing various training centres. This, however, is a feature which is likely to disappear as correct standards are increasingly realized by the latter.

In the "Gas Supply" section, there was a disappointingly small number of candidates; and the Examiners state that the standard of accomplishment in the Higher Grade examination is low, particularly in respect of ancillary subjects. There is a little offset to this in the fact that the Ordinary Grade students gave evidence of better grounding in fundamentals; and advance in this direction promises well for the future. It is strange that it should be found necessary for the Assessor in Gas Supply to have to call the attention of candidates to the fact that their standard of work is not high in respect of grammatical expression and spelling. It is obvious that there is a considerable amount of work still to be done in impressing these essentials to the complete training of men for both "Gas Engineering" and "Gas Supply." The Examiners' reports evidence the fact that not by any means too soon did the Institution take this work in hand.

Cost of Coal Commissions.

The cost of Royal Commissions and Courts of Inquiry on coal since the war has been £12,670.

"S.B.G.I." and Pipe and Tube Makers.

The Council of the Society of British Gas Industries have been authorized by the members to form, if thought fit, a new section for the makers of tubes and pipes.

Electricity Bill through the Commons.

The Electricity Bill received its third reading in the House of Commons on Friday. Out of the mass of amendments proposed, the industry secured, on behalf of local authorities owning electricity supply works, the right to engage in wiring and trading in electric appliances, together with hire and hire-purchase. Some of the municipal authorities have the powers already; but the majority have not.

In Parliament.

In the House yesterday week, the Premier outlined the Government programme for the conclusion of the present session. Among the Bills which he states they propose to pass into law before Christmas are the Electricity Supply Bill, the Merchandise Marks (Imported Goods) Bill, and the Rating (Scotland) Bill. The House is also to be asked to consider supplementary estimates for the relief of unemployment. There are a number of small important measures which the Government believe are non-controversial, and as many as possible will be passed into law. They include the Fertilizers and Feeding Stuffs Bill, Workmen's Compensation (No. 2) Bill, Local Authorities Bill, and the Smoke Abatement Bill. It is not proposed to proceed with the Factories (No. 2) Bill before the prorogation. The House is also to be asked to deal with a contribution under the Housing Act, 1924.

Coal Imports during the Stoppage.

As was expected, the imports of coal in October showed a reduction. The total received during the month was 3,489,083 tons—a reduction on September of 451,797 tons. But the fact that the aggregate value (£7,722,940) was only £26,161 less than that in September shows that the average price per ton was higher. The imports to the end of October total 14,326,780 tons, of the value of £28,139,779. The following are the figures for each month since the stoppage:

—	Tons.	Value.
		£
May	3,618	5,983
June	600,634	966,290
July	2,319,657	4,147,995
August	3,970,442	7,542,847
September	3,940,880	7,749,101
October	3,489,083	7,722,940

The average value per ton in May was £1 13s. 9d.; in October, £2 4s. 3·2d.

Bargain Sales at Gas Showrooms.

Why should not the showrooms of gas undertakings have an "annual sale" as do other shopkeepers? We see no reason why they should not; and the Newcastle and Gateshead Gas Company have shown good reason why they should. A paragraph in our issue last week stated that the Company's "annual sale" this year lasted twelve days—from Oct. 21 to Nov. 3—and, during the period, the orders taken for gas-consuming appliances doubled those of last year's sale. Orders were booked for 2450 fires, of which 40 p.ct. were sales outright, and 470 cookers, of which 33 p.ct. were sales. Regarding water heating, more than 300 wash-boilers and water-heaters were sold; also 350 grillers and rings, and over 900 lighting burners, in addition to thousands of sundry articles—such as shades, mantles, spark lighters, cooking utensils, &c. For the sale, the Company issue an attractive catalogue of what they have for disposal. There are "bargains" in every line. Good concessions in price are allowed; and everything is marked in plain figures. In the catalogue, the usual price is given, together with the sale price for purchase outright; also hire and hire-purchase terms, which, for orders booked during the sale, include free fixing.

Cost of the Stoppage to the Coal Industry.

The interesting information is published by the "Iron and Coal Trades Review" that the excess of expenditure over receipts at collieries in Great Britain during the stoppage up to the end of August was as follows:

May	£3,274,706
June	2,818,876
July	3,021,287
August	2,822,128
Total	£11,936,997

From these enormous figures of net outgoings, it is seen how much more serious from the employers' point of view is a stoppage in the coal industry than in other industries, where a cessation of operations does not involve the considerable costs of maintenance of underground workings. The expenditure named is, of course, quite apart from the loss of revenue incurred by employers and employed in the coal industry, in common with the rest of the country. The wages the miners have lost during the six months' stoppage amount to about £70,000,000. This sum, it is explained by the "Review," is equivalent to the reduction in wages over nearly four years, if the minimum offered by the owners for an eight-hour day immediately before the stoppage had been operative over the whole period—a contingency which was unlikely to arise, on account of the improved economic position of the coal industry from the reduction in costs.

National Gas Council.

It will be seen from the minutes of the Central Executive Board of the National Gas Council that, among the several matters which they have under consideration at the present time, are two in connection with which they are seeking the opinion of their legal advisers. The first question refers to contracts for coke, pitch, and other residual products entered into prior to the commencement of the coal stoppage. It is felt that, in view of the present abnormal conditions, some protection should be afforded the gas industry in respect of such contracts; hence the position is to be the subject of legal consultation. Another question has arisen in relation to the Public Utility Companies (Capital Issues) Act, 1920. Many companies took advantage of the provisions of the Act to obtain the necessary consents to increase their borrowing powers, and issued redeemable securities up to 50 p.ct. of their share capital.

These securities have in certain cases been redeemed by cash payments without the creation and issue of new stock, and without providing substituted stock. The question has therefore arisen as to whether the application of the Act permanently enlarged the borrowing powers of the companies, thereby enabling them to reborrow at any time up to the full amount of the extended powers; or whether, on the expiration of the Act, and on the redemption of the loans by cash payments, the companies reverted to their original borrowing powers. Counsel's opinion is to be taken.

PERSONAL.

Alderman J. H. LLOYD has been re-elected Chairman of the Birmingham Corporation Gas Committee.

At a special meeting of the Droitwich Town Council last week five applicants (out of seventy) for the post of Gas Engineer were interviewed; and eventually Mr. C. C. SIDAWAY, Assistant Engineer at Scunthorpe and Frodlingham Urban District Council Gas-Works, was appointed.

"Congratulations not unmixed with envy will," says the "Co-Partners' Magazine" of the Gas Light and Coke Company, "fall to the lot of Mr. W. MCDOWALL, the Chief Officer of Stores, on his recent completion of fifty years of service on the Company's staff. Few men of his age are so fortunate in retaining the freshness of outlook proper to youth, and a lightness of foot and brightness of humour, both well in keeping with the younger generation whose interests and amusements he has always been so ready to foster and to share." The occasion was marked by the presentation, which was made by the Governor on behalf of the Court of Directors, to Mr. McDowall of a gold wristwatch and bracelet.

At Manchester, Alderman Sir WILLIAM KAY, who has been Chairman of the Gas Committee for fifteen years, and has been prominent in all its works, failed to secure election to the chair again, and has been replaced by Alderman COOK, who has been a member of the Council for eighteen years. Sir William's service in the Council goes back 26 years.

OBITUARY.

The death has occurred of Mr. HENRY ALFRED PEASE, son of Mr. E. Lloyd Pease, of Messrs. Ashmore, Benson, Pease, & Co., Ltd. Deceased, who arrived in England a few months ago, after representing the firm in Australia, was only 32 years of age. Death was due to septic poisoning.

EVENING STAR CHAPTER, No. 1719.

The Evening Star Chapter, No. 1719, held its election convocation last Wednesday, at Freemasons' Hall, Great Queen Street, London. It was well attended.

Ex. Comp. Charles Hulme, P.Prov.G.Std.B. Middlesex, presided as Z., with Ex. Comp. Walter T. Dunn as H. (in the regretted absence through indisposition of Ex. Comp. Charles Clare); and Ex. Comp. Rae P. Normand as J.

After the customary preliminary business had been dealt with, Bro. Alfred B. Potterton and Bro. Thomas F. C. Potterton, both of whom are officers in the Evening Star Lodge, were balloted for and elected as candidates for exaltation. They were received in due form and conducted through the ceremony; the P.S. being Comp. Walter McDowall. Ex. Comp. Arthur Valon, P.Z., also officiated.

It was announced that the distinction of Chapter London Rank had been lately conferred by Supreme Grand Chapter on Ex. Comp. Reginald W. Foster, P.Z. 1275, one of the founders of the Evening Star Chapter, and its first Scribe E. The regalia appertaining to the rank was presented to him; and he warmly expressed his appreciation of the compliment.

A Past Principal's jewel was voted to Ex. Comp. Hulme, in recognition of the interest he had shown in the Chapter.

The election of the principals and officers for the year 1926-27 resulted as follows:

Z	Ex. Comp. Charles Clare
H.	Ex. Comp. Rae P. Normand
J.	Comp Walter McDowall
Scribe E.	Ex. Comp. Alfred C Beal, P.Z.
Treasurer	Ex. Comp. William A Surridge, P.Z., P.G Std.B.
D.C.	Ex. Comp. Harry W. Packham, P.Z.
Scribe N.	Comp F. J. West
P.S.	Comp. Wallace W. Hamwood
1st A.S	Comp. E. G. Bartholomew
2nd A.S	Comp. G. D. Bidwell
Steward	Comp. Herbert H. Dashwood
Steward	Comp. John R. Masters
Janitor	Ex. Comp. R. H. Goddard

ELECTRICITY SUPPLY MEMORANDA.

THE House of Commons last Wednesday commenced the slaughter of the big batch of proposed amendments to the Electricity Bill. Few were accepted; and those were chiefly Government emanations. One clause was passed which will fill municipal electricity authorities with joy. That was the one which gives them sanction to sell to, and instal for, consumers electric lines, fittings, apparatus, and appliances for lighting, heating, motive power, and any other purposes. The clause is the one which has been agreed between local authorities and electrical contractors. Sale to consumers is not to be at less than the recognized retail price; but sales to contractors may be at the recognized trade prices. During the debate, the Attorney-General (Sir Douglas Hogg) mentioned that 80 out of 380 local authorities have the powers which the new clause confers. It will be remembered that the Standing Committee were of opinion that, whatever the merits of the clause, it should not be included in the Government Bill. The Government, however, now left the clause to the free vote of the House; and thus one objective of the Municipal Electrical Association has been gained.

The Fittings Clause Won.

The Bill.

Before Parliament reassembled, there was a great revival of attacks upon the Government measure. One of the things many members of the Conservative party deeply resent is that the Bill incorporates one of the most effective plans ever advanced for paving the way for establishing the principles of Socialism. "The Electrical Times" has attempted to belittle this view—not that our contemporary is in unqualified love with the Bill, but apparently it disagrees with the judgment as to the purity of its Socialistic quality. Our contemporary asks: "What Bill for the improvement of any public services—electric or otherwise—could escape the accusation of 'Socialism?' Co-ordination and organization of any utility conduces to Socialism, in one sense of the word. The Water Board is Socialism, a municipal electrical department is Socialism, even the Gas Light and Coke Company is Socialism, or it conduces to this end, or prepares the way for it." The "Electrical Times" is unhappy in its argument. In not a single case which it instances is the controlling body appointed by a Government Department representing the State. In relation to this scheme, the all-powerful bodies are the Electricity Commissioners and the Central Electricity Board. The former are appointed by the Minister of Transport. The eight men who are to form the Central Board are also to be selected by him. Why? The State-appointed Board will have control of the capital expenditure on generation and transmission, and will exercise a control over the management of generation. This is a big innovation in industry. Small wonder Mr. Ramsay Macdonald, at Cambridge this year, made the remark: "The Electricity Bill will be found to be not only for itself, but for its beginnings and its effects, one of the most substantial advances in the direction of Socialism; and I laugh and laugh every time I see a Tory supporting it." He would probably also laugh if he read the note on the subject in our contemporary.

Industrial Hostility.

The opposition to the Government scheme is not only political and electrical, but industrial. The industries of the country realize that they are being deprived, under the Government scheme, of the advantages which arise from their regional concentration in the matter of getting electrical energy at the lowest possible cost. Those advantages are to be appropriated to assist in giving the rural and unprofitable areas electricity supply at a lower charge than could possibly be obtained otherwise. With some justification, manufacturers anticipate that this will result, under the operation of the law of averages, in an uplifting, instead of a reduction, of the charges made to them. At a recent conference of the Textile Institute, there was strong criticism of the Bill. It was stated that in Lancashire supplies of current are given for textile driving at prices varying from 0·55d. to 0·8d. per unit; the average being about 0·65d. The opinion was expressed that, if current could be delivered, as low-tension energy, at between 0·5 and 0·6 per unit, it would be generally adopted for textile purposes. The President of the Institute (Mr. William Howarth) is emphatically persuaded that industry will have to pay for the introduction of electricity into villages, farms, &c. The same point was made at a meeting the other day of the Electricity Committee of the Newcastle Chamber of Commerce, when a series of amendments were proposed which the local members of Parliament were asked to support. Among them is "that no burden shall be placed on industrial areas to help unprofitable areas."

Testimony for Gas-Fires.

A frank testimony to the gas-fire appeared in the "Electrical Review" on that red-letter day, the Fifth of November. It was signed "Fireside." The writer stated that he never looks at a catalogue of electric heaters without feeling that, until something very much better

is offered, there can be no real progress in domestic electric heating. He comments on their "flimsy appearance," "tin-can construction," and little artistic merit. He admits that the absence of combustion makes lighter construction possible; but it does not make flimsiness permissible. A few months ago, "Fireside" was much impressed when he visited a large gas showroom, and saw how well gas engineers have dealt with their fire problem, which reminds us that electrical men and electricity consumers are always very welcome in the showrooms of the gas industry. "Fireside" saw that their results were genuinely excellent. We heard of a lady the other day who had adopted an electric cooker, and had found that it cost her 4½d. to do a certain amount of cooking, which demonstration at an exhibition proved could be done for 1½d. by gas—at the prices then ruling in that particular locality. She has reverted to gas. However, "Fireside" purchased a gas-fire, which, when it is lighted, "looks exactly like a heaped-up coke fire, and gives a fierce heat, with no smell." The total cost installed was £2 18s. But the cheapest electric heater he would fit in his house costs £7 10s.; and the circuit would run him into another £1 10s.—making £9 in all.

Housing Schemes. Throughout the piece, so far as we have been able to ascertain, the London County Council have, in housing schemes, endeavoured to hold the scales fairly between gas and electricity. At the present time, with all the experience there has been, they are still far from satisfied that, for people of slender means, electric cooking is something they can conscientiously introduce. It is not so with all housing authorities. We had the example of Woolwich recently, where over 300 of their tenants on the Eltham Estate complained bitterly of the excessive burden upon their not overloaded pockets through the compulsory use of electric cookers. The County Council have recently had before them the question of lighting and cooking in 188 tenements on the Hornsey Rise Housing Estate; and, as a result of negotiations between the Gas Light and Coke Company and the Islington Borough Council, they have decided upon electric lighting, but gas cooking and heating. The Gas Light and Coke Company intimated that they were prepared to instal a gas supply and cooker, in each tenement, subject to the payment by the Council of £1 per tenement, and that the Company were free to fix one lighting point in the scullery or kitchenette—the gas to be supplied through prepayment meters at the current price for the district. The Islington Borough Council did not wish to be involved in any way in the wiring of the tenements; but they offered to supply electricity in bulk—leaving it to the Council to arrange for the distribution of the current, and the collection of the money through prepayment meters. The price the Council are paying for current in bulk is 3d. per unit, *plus* any percentage increase or decrease which may be made by the Borough Council from time to time. At present an increase of 25 p.ct. is in force, which makes the price 3¾d. per unit. This discloses an interesting point. The 3¾d. per unit is the current average figure at which it is possible for the Borough Council to supply energy in bulk to the County Council; but, according to the decision of the latter, it will be necessary to charge the tenants at the rate of 8¼d. per unit. The Borough Council are, of course, making a certain profit from the 3¾d. per unit; but the difference between that and the 8¼d. per unit is 4½d. The figures show that the cost of distribution among the tenements and the fitting-up will necessitate a charge greater than the bulk charge per unit made by the Borough Council. Supposing the tenants desired to use current for some other purpose than lighting, what would happen? Would the Council be in a position to charge a competitive price for the current for which they are paying 3¾d. per unit? This bulk supply business, in the case of electricity, is going to be a difficulty. The cost of the electric installation in the tenements in question, it is estimated, will be £3220. However, although the tenants are to have one agent for lighting and another for cooking and heating, we have not the slightest doubt that they will find themselves much better off than if they had been confined to electricity. Had general gas lighting been included, they would have found still further economy.

Some Cooking Tests. While referring to this matter of cooking in connection with housing schemes, attention may be directed to the article which was reproduced from "West's Gas" in "THE GAS SALESMAN" last week, and which was contributed to our delightful young contemporary by Mr. A. E. Ruffhead, the Engineer and Manager of the Darlington Corporation Gas-Works. The purpose of the article was to communicate the results of some perfectly independent tests, which had been made by the head cookery mistress of the Corporation Education Department, regarding the relative costs of cooking by coal, gas, and electricity, under comparable conditions, during her instructional lectures. The purpose of these was to provide information for the Housing Committee in connection with a new housing scheme, which initially will comprise 200 houses. One can appreciate that, had the head cookery mistress been able to devote her whole attention to the cooking, instead of having occasionally to stop to explain her methods to the students, the figures might have been somewhat reduced. At the same time, they were all obtained under comparable conditions without favour being shown to one or other of the fuels. The figures which resulted from the tests show that coal is the most expensive of all fuels for cooking, in view of the fact that there has to be an expenditure of coal, lighting material, and labour in order to ignite the fire, and bring the oven up to baking point before cooking can begin. The conditions of the tests were precisely similar in each case. Four loaves of bread were baked, two batches of pastries, rhubarb tart, and Yorkshire pudding. A joint of beef was roasted, and potatoes and cabbage boiled. The consumption was 67·7 c.ft. of 475 B.Th.U. gas, the charge for which is 2s. 6d. per 1000 c.ft. or 6·3d. per therm. The cost for gas was 2d. The consumption of electricity was 6·3 units at 1d. per unit, making the cost 6·3d. The coal charge, at 40s. per ton, to make and maintain the fire, was 10d. With equal cooking, the loss of weight of meat with gas was 15·9 p.ct.; with electricity 18·6 p.ct. In the water heating tests, six gallons of cold water were heated to boiling point. The consumption was 46·3 c.ft. of 475 B.Th.U. gas, which, at 6·3d. per therm, cost 1·38d. The electricity consumption for doing the same work was 4·1 units, at a 1d. per unit, or 4·1d. A test was not made with coal for water heating. Thus it will be seen that the cooking cost by electricity 4·3d. more than by gas; and the heating of the six gallons of water by electricity 2·72d. more than by gas.

Mishaps. A report received from Paris on the 28th ult. stated that a short circuit in an hotel in the Rue de Chalon, near the Gare de Lyon, started a fire, which spread to the staircase, and prevented people in the hotel from leaving. Through the fire, some of the occupants of the bedrooms jumped from the windows, while about twenty other residents were rescued by the firemen. The same day, an account was published of a disastrous fire which occurred at Bilston early the previous morning, when the Lion Hotel was found to be on fire about 2 a.m. The origin of the disaster, "it is thought, was the fusing of an electric wire." All the people in the place were rescued. The investigation by a mouse of the switchboard at the Woking Electricity Works last Wednesday week caused a "short" which put all Byfleet users of electricity into darkness, caused them much inconvenience, and occasioned the death of the mouse. It does not take much to produce an interruption of an electricity supply.

FORTHCOMING ENGAGEMENTS.

Nov. 18.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting at Birmingham. Paper by Mr. P. H. Wilson, of the Stanton Ironworks Company, Ltd.

Nov. 18.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, at 2.30.

Nov. 19.—EFFICIENCY CLUB.—Discussion on the Relative Fields and Merits of Gas and Electricity.—7.30 for 8. Vernon House, Park Place, St. James' Street, S.W.

Nov. 20.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Sheffield.

Nov. 26.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. F. S. Larkin.

Dec. 4.—WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.—Joint visit with Western Junior Gas Association to the Beckton Works of the Gas Light and Coke Company.

Dec. 4.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Joint meeting with Eastern District, at Edinburgh. Paper by Mr. C. B. Tully.

Dec. 7-8.—INSTITUTION OF FUEL TECHNOLOGY.—Meeting.

Dec. 8.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the Stretford Gas-Works. Paper by Mr. J. Carr.

Dec. 8.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Visit to the works of Messrs. Parkinson & Cowan, Ltd.

Dec. 14.—NATIONAL GAS COUNCIL.—Meeting.

Dec. 14.—FEDERATION OF GAS EMPLOYERS.—Meeting.

Dec. 16.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting at Birmingham. Paper by Mr. A. Knight.

Dec. 17.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Paper by Mr. C. M. Croft.

Feb. 16.—"B.C.G.A." MIDLAND DISTRICT CONFERENCE.

INSTITUTION OF GAS ENGINEERS.

Dec. 13.—Emergency Committee, Finance Committee.
Dec. 14.—Advisory Committee on Education.

INSTITUTION OF GAS ENGINEERS.

Examinations in Gas Engineering and Gas Supply, 1926.

Second List of Successful Internal Candidates.

In sending us the list of successful internal candidates in the Institution's Examinations in Gas Engineering and Gas Supply, Mr. Walter Hole, the Organizing Secretary, writes as follows:

I have pleasure in sending an abstract of the Examiner's Report for publication, and also a further list of successes gained at the examinations held last May. There is still one outstanding case, which is being investigated by the Board of Education. With that exception this list is final.

Perhaps a word of explanation of the delay in issuing this list is desirable in view of the large number of letters which have been received on the subject. In the first place, this has been due to the extraordinary dilatoriness of some of the technical schools in forwarding the record forms relating to their candidates, upon which the award of certificates is based. Some reached the Organizing Secretary as late as Oct. 7, and others on Sept. 27, and still others on Sept. 8. In the second place, additional delay has been caused by the inadequate filling-in, in many cases, of the particulars required on the record forms, which has necessitated reference to, and personal investigation by, H.M. Inspector at the school.

The Committee are extremely desirous that the results should be made known as soon as possible after the examinations. They realize the seriousness of, and the inconvenience caused by, such regrettable delay; and steps have been taken which will, it is hoped, obviate any possibility of it recurring in the future.

WALTER HOLE,
Organizing Secretary.

SECOND LIST OF SUCCESSFUL INTERNAL CANDIDATES.

HUDDERSFIELD TECHNICAL COLLEGE.

Gas Supply—Ordinary Grade.

Name.	Class.	Ancillary Subjects Taken.
Beaumont, A.	2nd	Building Construction, Electricity, and Magnetism.
Ward, G. A.	2nd	Building Construction, Organic Chemistry.

LONDON, REGENT STREET POLYTECHNIC.

Gas Engineering—Ordinary Grade.

Stonham, B.	1st	Chemistry, Physics, Engineering Science.
Ibbett, N. G.	2nd	Maths., Chemistry, Physics, Engineering Science.
Beck, C. J.	2nd	Chemistry, Physics, Engineering Science.

Gas Engineering—Higher Grade.

Clarke, N. V.	1st	Chemistry, Engineering Science.
Watson, G. H.	2nd	Chemistry, Engineering Science.
Walker, M.	2nd	Chemistry, Engineering Science.
Kimmins, L. G.	2nd	Chemistry, Engineering Science.

LONDON, WESTMINSTER TECHNICAL INSTITUTE.

Gas Supply—Ordinary Grade.

Beretta, J. L.	1st	Engineering Science, Technical Drawing.
Craton, H.	1st	Engineering Science, Technical Drawing.

Gas Engineering—Ordinary Grade.

Poulter, L.	1st	Sat as advanced supply students in order to obtain first in Ordinary Grade Gas Engineering as a qualification for passing to the Diploma in Gas Supply.
Phillips, S. T.	1st	

ABSTRACT OF REPORT OF EXAMINERS AND ASSESSORS.

GAS ENGINEERING.

The number of candidates presenting themselves for examination, and the degree of their successes, were as follows:

—	Papers Worked.	First Class.	Second Class.	Failures.	Absent from Exam.
Ordinary Grade .	70	24 (4 W.D.)*	24	22	8
Higher Grade . .	39	10	16	13	..
Diploma Grade .	7	2 W.D. 1	1	3	..

* W.D. = With Distinction.

It is a pleasure to report that in each stage there were signs of great improvement over the work of previous years. The value of the training in cognate subjects is evidently having a marked effect, and is revealing itself in the work of the students.

The number of Diploma candidates is encouraging—the theses were consistently good, and the written and oral examination results gratifying. The type of man coming forward for this stage is particularly good, and promises well for the future of the industry.

The papers in the Higher Grade showed improvement over those of the two previous years. There is still, however, a tendency, both in this Grade and in the Ordinary, to side-track sketches where they are expressly asked for. The Examiners desire evidence that the candidates in the Ordinary and Higher Grades, particularly the latter, should be able to make a precise and reasonable sketch.

The Assessor is impressed with the great difference in the standard of papers in the Ordinary Grade presented by the various training centres; but as correct standards are increasingly realized, these differences may be expected to disappear.

The Assessors for Scotland report that the general impression made upon them is that the candidates had memorized accurately certain text-book answers regarding various processes, but they had not made themselves acquainted with the actual construction. For example, some of the sketches were very far from accurate in arrangement.

The Assessors feel that the students should use every opportunity available of examining processes and apparatus either in operation or when the latter may be under repair.

GAS SUPPLY.

The number of candidates entering for the examinations in Gas Supply and the results were as follows:

—	Papers Worked.	First Class.	Second Class.	Failures.	Absent from Exam.
Ordinary Grade .	33	13 (2 W.D)*	9	11	2
Higher Grade . .	5	..	2	3	..
Diploma Grade .	..	..	..	..	..

* W.D. = With Distinction.

The comments of the Examiners are similar to those of last year. It is felt that the numbers are disappointingly small having regard to the large number of potential candidates, and the standard of accomplishment in the Higher Grade Examination low, particularly having regard to ancillary subjects. The Ordinary Grade students, as last year, gave evidence of better grounding in fundamentals; and this, we feel, promises well for the future.

The Assessor in Gas Supply, in the course of his Report, states that "the standard of work was not very high, and candidates might well be directed to pay closer attention to grammatical expression and spelling."

Such sketches as were required were fair, although in this respect also improvement might be effected.

WILTON'S PORTABLE TAR-DEHYDRATING PLANT.

In France, road and rail distances are longer than in England, and the country is not so thickly developed industrially; and consequently it is not surprising to find, now that road tar interests have come fully to life, that the Wilton dehydrating and road-spraying units are entering into popularity. They were dealt with by M. Winckler in a paper before the International Road Congress in Milan; and our contemporary, the "Journal des Usines à Gaz," has referred more than once to them.

These Wilton road units permit the home treatment of crude tar, no matter how small the producing works; only simple apparatus and little labour being required. A unit comprises two tank lorries, and a trailer which is attached to one or other of the lorries, and on which is mounted the simple tar plant. The idea is to have one lorry at work and one filling up.

The crude tar is forced by a pump through a coil in the lorry tank; this coil passing across to a heater carried on the trailer, beneath which is a furnace. Tar flows from bottom to top of this heater, and its pressure is kept at such a point that neither water nor oils distil off; and circulation is kept going at such a speed as to avoid all danger of cokefication. Also, by keeping the pressure at about 2·5 kg., the temperature can be brought to 210° C. without the tar priming. This coil is brought out into an expansion chamber provided with dishes, where the pressure is suddenly translated to atmospheric; and water vapour, light oils, phenols, and naphthalene come away, while the prepared tar flows out from the bottom and into the tank of the lorry. The equipment of the trailer may be completed with one or two condensers and separators according to whether or not it is desired to separate the light and medium oils. The plant, though simple, is particularly robust, and upkeep charges are low.

We understand that in this country the plant can be supplied by the Chemical Engineering and Wilton's Patent Furnace Co., Ltd., of 76, Victoria Street, S.W. 1.

NATIONAL GAS COUNCIL.

A meeting of the Central Executive Board took place on Nov. 9—Mr. D. MILNE WATSON (President) in the chair.

Before the business of the meeting proceeded, the President announced that the Gas Light and Coke Company had opened a large new showroom in Church Street, Kensington, and that it would give him (as Governor of that Company) and the Directors great pleasure if the members of the Central Executive Board would visit the new showroom on Dec. 14, and take the opportunity of holding their next meeting there on that date.

The invitation was gladly accepted.

COAL POSITION.

In view of the fact that the winter season had commenced, gas undertakings were again urged to do everything possible to safeguard the position of their coal stocks, and to seize every opportunity to secure any coal which was offered.

CONTRACTS FOR COKE, PITCH, &C.

The question was discussed as to contracts for residual products entered into prior to the commencement of the coal stoppage. It was felt strongly that, in view of the present abnormal conditions, protection should be afforded the gas industry in respect of these contracts.

It was decided that the legal advisers of the Council should be consulted as to the position.

SEAHAM HARBOUR ELECTRICITY SPECIAL ORDER.

It was reported that the Electricity Commissioners had approved without inquiry the scheme of the Seaham Harbour Urban District Council for supplying electricity to Seaham Harbour and its vicinity, and that the Seaham Harbour Gas Company had lodged a memorial with the Minister of Transport, asking that the scheme should not be confirmed, or, if confirmed, that the "Northumberland" Clause should be inserted.

It had been decided that the National Gas Council should contest the case on behalf of the Gas Company; and the inquiry was to take place on Nov. 12.

PUBLIC UTILITY COMPANIES (CAPITAL ISSUES) ACT, 1920: BORROWING POWERS.

It was reported that a difficult question of law had arisen with reference to the above Act. It was recalled that, where the Special Act authorized the creation and issue of debenture stock or the borrowing of money to a limited extent, the Public Utility Companies (Capital Issues) Act, 1920, in section 1 (*d*), enabled such companies, where their capital powers were limited, to create and issue debenture stock or borrow money to an extent not exceeding half the share capital for the time being issued and paid up. In section 2 (ii.) it was stated that the Act should continue in force for five years and no longer, but that the expiration of the Act should not affect the validity of anything done in pursuance thereof.

It was stated that many companies took advantage of this provision to obtain the necessary consents to increase their borrowing powers, and in exercise of such had issued redeemable securities up to 50 p.ct. of their share capital. These securities had in certain cases been redeemed by cash payments without the creation and issue of new stock and without providing substituted stock. The question had arisen whether the application of the Act had permanently enlarged the borrowing powers of the companies, thereby enabling them to re-borrow at any time up to the full amount of the extended powers, or whether on the expiration of the Act, and on the redemption of the loans by cash payments made under the Act, companies reverted to their original borrowing powers.

As the point might be of interest and importance to a number of undertakings, it was agreed to take counsel's opinion on the question.

COSTS OF SPECIAL ORDERS.

It was reported that the Council had taken counsel's opinion with regard to the liability to income-tax of expenses incurred in the promotion of Special Orders, and that counsel's opinion was favourable to the general contention that the expenditure must be divided between capital and revenue in accordance with the matters to which the Special Order related. It was stated that the Council were therefore awaiting a suitable case in order to raise the whole position.

TAR.

It was reported that advantage had been taken of the British Commercial Gas Association's Conference at Newcastle to convene a meeting of the Joint Tar Committee (*a*) with Coke Oven Representatives in the North, and (*b*) with Highway Surveyors from the North-East Coast. The former meeting had been presided over by Mr. M. H. Kellett, of the Chilton Collieries, Durham. Mr. Milne Watson had attended the meeting in question, and had taken the opportunity of pointing out to the coke oven representatives present the importance of supporting the work of the British Road Tar Association, and of ratifying the constitution at an early date, to enable the Association to be put upon a proper basis.

At the meeting with surveyors from the north-east district, the suggestion was made that a Joint Consultative Committee should be formed between tar producers and highway surveyors in the district, similar to that already in existence in the South of England.

Suggestions have also been made that similar Joint Committees should be formed in other parts of the country—viz., Scotland and South Wales.

Steps are being taken to bring these suggestions before the Council of the Institution of Municipal and County Engineers, and the County Surveyors' Society.

DRAFT SPECIFICATION FOR TAR FOR ROAD SPRAYING.

It was reported that the British Road Tar Association had been considering the draft of a new specification for tar for road surfacing, which it had been decided to submit to the producers for their suggestions. Copies were handed to the members of the Board for their consideration and suggestions, at an early date.

BRITISH TUBE ASSOCIATION.

It was stated that a large number of gas undertakings purchased wrought-iron pipes and fittings direct from the manufacturers; and it was suggested that, where these purchases were on a sufficiently large scale, gas undertakings should be entitled to the same terms as merchants and other large buyers.

It was agreed that the Council should make representations to the British Tube Association that the merchants' discount of $12\frac{1}{2}$ p.ct. should in like circumstances be allowed to gas undertakings.

CONFERENCE WITH METER MAKERS.

It was reported that, in accordance with a previous decision of the Board, a conference had been held on Oct. 13 between representatives of the meter makers and the Committee appointed by the Council, with regard to proposals for amalgamation of meter companies and the creation of a profit-sharing scheme as between makers and buyers.

The meter makers stated that they were not unanimous with regard to such proposals. They had, therefore, been informed that, if at any time they were desirous of putting forward an agreed scheme, the Committee of the Council would be prepared to meet them and discuss the position.

HOUSING (RURAL WORKERS) BILL.

Reference was made to this Government measure introduced by the Ministry of Health, whereby local authorities might submit to the Ministry schemes with respect to the reconstruction and improvement of houses or buildings within their areas, and when such schemes were approved by the Minister, local authorities might give financial assistance thereto by either grant or loan.

The Bill provided that each scheme was to specify the nature of the works in respect of which assistance was to be sought, and such works "may consist of structural alteration, repair, addition, provision of water supply or sanitary conveniences, or other like works."

It was agreed that the Council should endeavour to obtain an enlargement of the definition of works to be assisted, so as to include the provision of "gas supply" in addition to "water supply."

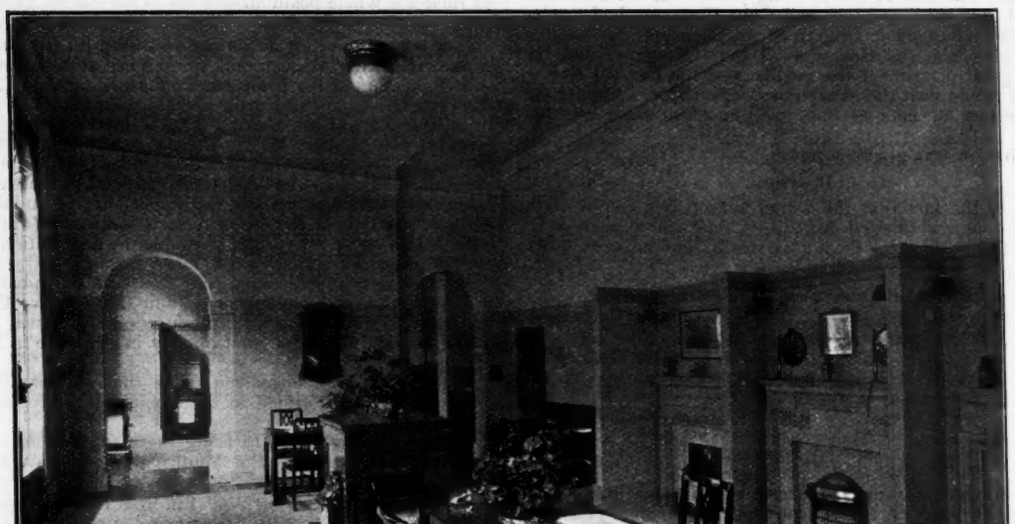
SMOKE ABATEMENT ABROAD.

Commenting on the recent Smoke Abatement Conference in Birmingham, our contemporary, the "Journal des Usines à Gaz," says it is not only in Great Britain that the pure-air campaign has become a burning question—in Germany it is in the forefront of current activities; and in the United States it has resulted, in the majority of States, in regulations sometimes Draconian, the rigid enforcement of which has in many cases entirely banished the smoke nuisance.

Nor is the campaign a novelty in France, as witness the Order made in Paris in 1854 by M. Pietri, Prefect of the Seine, based on the report of the eminent chemist Boussingault—a report which might have been written yesterday, and which extolled the use of coke as the best solution of the smoke problem. This was followed in 1855 by an "Instruction of the Council of Public Hygiene and Health of the Department of the Seine," setting out means of suppressing smoke by the improvement of combustion. Then came the 1898 Order, which is still active, "and the application of which is enforced from time to time." At the present moment there has been organized by the Bureau of Research and Invention a conference of those interested in smoke-consuming appliances; and a fund of 10,000 francs has been put at its disposal by the Seine Council. Our contemporary compares the gas consumption per consumer per annum of Birmingham, London, Paris, Paris Suburbs, and Lyons. The figures, in cubic metres, are: 1600, 1100, 660, 590, 450. We wish our French friends speedy fortune in reducing the hiatus.

NEW SHOWROOMS OF THE GAS LIGHT AND COKE COMPANY.

Well-Situated Premises in Walham Green.



A VIEW THROUGH THE GENERAL SHOWROOM.

An Active Year.

It is no use professing faith in the value of publicity and good service unless this idea is translated into action. The Gas Light and Coke Company hold the belief—founded on experience—that the gas industry should make known to the public the value of a good gas supply, and should couple with their publicity work a really first-class service. And the Company not merely hold this belief; they act upon it. Their action in this respect is characterized by the energy and thoroughness with which they tackle all their problems. During the past twelve months, showrooms of which it can be truly said that they combine art and utility have been opened in Westminster, Islington, Golders Green, Goodmayes, and Edgware; and last month, on Oct. 19, H.R.H. the Duchess of York performed the opening ceremony of the new showrooms and offices in Church Street, Kensington, which premises are certainly the finest for their purpose in this country, probably in the world.

A Further Advance.

The opening of a new showroom and district office at the Broadway, Walham Green, on Nov. 10, marked a further step in the Company's policy of meeting the steady increase in the demand for modern gas labour-saving appliances by providing throughout their area conveniently situated offices and showrooms where the latest and most efficient types of apparatus can be chosen—and here it may be mentioned that the number of fires, cookers, and water heaters sold or let on hire by the Company is increasing at the rate of 100,000 a year.

The new showrooms have supplanted the local office at Harwood Terrace, which had become inadequate to cope with the requirements of the 52,000 customers in the Fulham, Walham Green, and West Kensington district. The site of the new premises is an excellent one, for it is in the centre of a shopping area well served by trains and omnibuses. Mr. W. J. Tapper, A.R.A., F.R.I.B.A., was responsible for the design, decoration, and furnishing of the showroom, and the contractors employed were Messrs. J. & R. Rooff.

Arrangement of the Premises.

The corner-site building is a four-storey one. The main showroom, or what may be termed the reception lounge, is on the ground floor; and here accounts are paid. There is no provision for window displays; instead, the passers-by are able to see the whole showroom as one large and attractive exhibit. On the first floor are the hot water section, the cooker display, and the hire-fire and lighting fittings room. More elaborate fires are displayed in the reception lounge; and the connections to these and to all fires throughout the building are concealed—a practice which enhances the clean, efficient, and artistic appearance of the gas fire, and one which, as we have said before, could with great advantage be more universally adopted.

In the lighting fittings room, care has been exercised to preserve the general effect of the decorative scheme, which is grey and cream. The Company have five standard plain colours for their silk shades; and these colours will be shown successively, and not in a jumbled mass. On Nov. 10 the colour was red, and the effect was excellent. Throughout the building the lights are switch controlled—a feature which attracted considerable attention on the opening day.

The second floor is devoted to offices and a staff dining room, and in the basement is an office for the prepayment meter collectors.

Opening Ceremony.

The opening ceremony was performed by the Mayor of Fulham (Alderman W. J. Waldron, J.P.), who was accompanied by the Mayoress and supported by many of the members and principal officers of the Council, the Fulham Chamber of Commerce, the West Kensington and Fulham Chamber of Trade, and the Rotary Club.

The visitors were welcomed by Mr. D. Milne Watson, D.L., LL.D., the Governor of the Company, with whom were Messrs. R. M. Holland-Martin, C.B. (Director), R. W. Foot (Assistant General Manager), W. L. Galbraith (Secretary), F. W. Goodenough, C.B.E. (Controller of Gas Sales), and Stephen Lacey (Deputy Controller of Gas Sales).

"Fairy Gas" Competition.

Mr. Milne Watson said that, before asking the Mayor to declare the new showrooms open, he had a short statement to make. The British Commercial Gas Association held annually a competition for children, known as the "Fairy Gas" Competition. There were two sections; one for children between 10 and 16 years of age, the other for those under 10. This year over 100,000 children entered for the competition, and 9000 efforts were selected by their teachers for submission to the judges. The older boys and girls were asked to write an essay on "Gas is the Housewife's Helpmate," after reading a leaflet entitled "Coal is the Housewife's Checkmate." The first prize—a scholarship of £50—was won by a girl in Cardiff. The

Cooker Section.

Cashier's Counter and Enquiry Office.

second prize of £5 was won by the son of one of the Company's consumers—W. J. F. Reeves, of Stratford, who was with them that day, together with his parents and his teacher from Carpenters Road School, Stratford. The Gas Light and Coke Company, said Mr. Milne Watson, proposed to give Willie Reeves stock in the Gas Light and Coke Company to the value of £5, as an addition to the prize of £5 awarded him by the "B.C.G.A." It was suggested to his parents that the prize should be similarly invested.

Two other children over ten years old from the Company's area were awarded "meritorious" prizes of 10s. each; and the Directors proposed to add sufficient to buy for each of them a £1 share in the Company. The names of the prize-winners were Nellie Hewson and Florence Goldsack. Of the younger children—those under 10—who entered for the painting section of the competition, a girl from the Company's district won the third prize of 10s. In this case also the Company proposed to add sufficient to enable her to purchase a £1 share in the Company.

At this stage the MAYORESS presented the prizes.

MAINTAINING THE GAS SUPPLY.

It was now his privilege, continued Mr. MILNE WATSON, to ask the Mayor of Fulham to declare the premises open. The Gas Light and Coke Company served the whole of the Fulham area, in which they had no fewer than 52,000 consumers, who depended largely for their comfort and well-being on an efficient gas supply. In these circumstances, it was only right that the Company should do all possible to render their customers a thoroughly good service; and it was for this reason that the new premises, which were situated conveniently and in the centre of a shopping area, had been brought completely up-to-date, to supplant the old office at Harwood Terrace. As they would see, the Company did not believe in hiding their light under a bushel. At present, owing to the coal stoppage, they were having to cope with a most difficult situation. It was true to say that the Company had literally ransacked the earth to obtain coal. They had spared themselves no pains to secure a supply, some of which had come from Czecho-Slovakia, some from Westphalia, Canada, and the United States of America, and some even from Calcutta. And after six months of the coal strike they were maintaining a supply of gas which throughout that period had never failed. [Hear, hear.]

He felt sure that His Worship the Mayor would agree with him when he said that there was room for both gas and electricity in Fulham, and that both were essential to modern existence. By co-operation they could do a great deal to render the lives of those in Fulham easier and healthier—easier by eliminating drudgery in the home, healthier by purifying the atmosphere without—a question in which the Mayor was greatly interested.

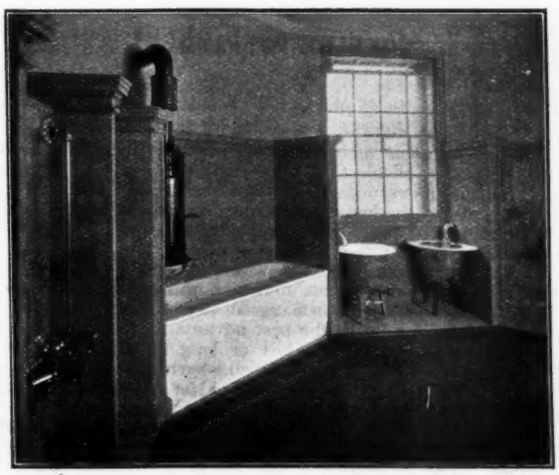
TRIBUTE TO A GREAT UNDERTAKING.

The MAYOR OF FULHAM first of all congratulated the "B.C.G.A." on the success which had attended their efforts in regard to the "Fairy Gas" Competition. He went on to say that the Fulham Electricity Department intended to open new showrooms in the Broadway, opposite to those of the Gas Company. The latter, however, had got in first. [Laughter.] He thought it one of the duties of any mayor to take a keen interest in the commercial and industrial activities in his district. Certainly he was much interested in the doings of the great Gas Light and Coke Company, whose work added so greatly to the health and comfort of those in their area of supply. They were assembled that day in a bright and cheerful building which was formerly an austere banking house. It was situated in one of the most important parts of the borough; and he congratulated the Company in securing such an excellent site, where people could conveniently choose gas appliances under ideal conditions. The building would doubtless be much frequented. The association of Fulham with the gas industry was of long standing. The Gas Light and Coke Company's Fulham Works—which were among the most up-to-date in the country—occupied no less than 29¾ acres; and it was an astounding fact that there were 52,000 of the inhabitants of Fulham on the Company's books. He thoroughly agreed with Mr. Milne Watson that there was ample room for both gas and electricity, and that they could work side by side for the well-being of the community. To his mind, healthy competition was better than any monopoly.

CO-PARTNERSHIP.

There was one other matter, said the Mayor, to which he

A Display of Lighting Fittings.



A Corner in the Hot-Water Section.

would refer, and that was the excellent spirit of comradeship which prevailed among the employers and employed of the Company. The Company had nearly 20,000 employees, whose welfare was fostered by a highly satisfactory co-partnership scheme. He believed that co-partnership could solve many of their industrial troubles. [Hear, hear.] For all these reasons they should support the Gas Light and Coke Company's new enterprise.

Mr. MILNE WATSON proposed a vote of thanks, which was carried with acclamation, to the Mayor and Mayoress.

Following this, those present were entertained at tea, and then inspected the various exhibits in the showrooms.

A MODERN GAS FURNACE.

We reproduce an illustration of a modern gas furnace, 30 ft. long, recently installed in the Chesterfield area of gas supply. The furnace was designed for special work requiring a constant temperature of 1250° C., and has been in successful operation for several months. It is of the open type, and no muffle is used. This feature has been made possible by the "surface combustion" system of firing, in conjunction with a clean, constant quality fuel such as town gas. The furnace is heated by 76 impact-type burners arranged down each side of the furnace; and these burners are supplied with a correctly proportioned and thoroughly homogeneous mixture of gas and air through ten "surface combustion" air-gas proportioners. These proportioners use air under a pressure of about 1 lb. per sq. in. along with gas at ordinary town pressure, and automatically maintain constant and correct proportions of the gas and air in the mixture supplied to the burners without any attention on the part of the operator.

The amount of air-gas mixture consumed by the burners is controlled by manipulation of the air valve only; and a gauge is fitted to the burner manifold, by which the operator sets the air cock to maintain a certain definite heat. The burners discharge the perfect mixture of gas and air into beds of broken refractory; combustion being instantaneous and complete on the surface of the broken material. The beds rapidly attain a state of incandescence, and radiate heat equally in all directions. The material being heated is protected against direct radiation from the beds, and only receives reflected radiant heat from the furnace walls and roof. Combustion being flameless, there is no flame contact with the work. As a slight pressure is carried in the furnace, there is no possibility of air being drawn into it from the atmosphere. Heating is absolutely uniform from end to end of the furnace, and the single valve control gives positive control of temperature.

The firebrick lining of the furnace is backed-up throughout with 2½ in. of "Sil-O-Cel" insulating brick, which reduces the heat losses to a minimum. The casing is constructed of mild-steel plates rigidly braced together by buckstays and tie bolts.

The furnace can be heated up, from a cold start, to 1250° C. in 2½ hours on a gas consumption of 18,500 c.ft., and to maintain a temperature of 1250° C. in the furnace with the doors closed requires 3500 c.ft. per hour. It is worthy of note that during the past seven years the output of gas in Chesterfield has been more than doubled, representing an annual 10 p.ct. compound increase. While this cannot be attributed to an increased industrial load, it is evident from this article that no opportunity is lost by the Chesterfield Gas Department in exploiting gas for all purposes.

The furnace was designed and constructed throughout by British Furnaces Ltd., Derby Road, Chesterfield.

COKE BY PREPAYMENT.

Why not sell coke on the prepayment system? asks Major P. H. Richardson, of Messrs. O. Bruster & Richardson. The following is his suggestion with regard to the matter.

The prepayment meter was invented to enable the artisan and the poorer people to use gas; and many gas undertakings have an enormous number of these meters in use. Now that the first cost of the installations has been recovered, the prepayment branch of most gas companies' business is a very remunerative one.

Coke is the cheapest smokeless fuel at present on the market, and it is the poorer people to whom this fuel should appeal. The time, I feel, will soon arrive when gas companies, to dispose of their coke to the best advantage, will have to consider letting out on simple hire or long term hire-purchase—preferably the former—suitable coke-burning apparatus, such as hot water boilers, open coke fires for heating rooms, and closed stoves for general heating.

With the poorer class of people, whose budget is a weekly one, there might be some difficulty in collecting cash for coke supplied. The suggestion is that the price-changing wheels of the prepayment gas meter should be altered to allow a 20 p.ct. or 25 p.ct. excess charge to be made through the meter. The collector, when emptying the meter, would then allocate in suitable columns in his book, and on the customer's receipt, 75 p.ct. or 80 p.ct. of the money in the meter to the purchase of gas already supplied, and the remaining 25 p.ct. or 20 p.ct. to the purchase of coke already supplied or to be supplied.

This would solve the difficulty of collecting small payments for coke, and at the same time would tie the consumer to the gas undertaking for his supplies of solid fuel.

These consumers would not then be so likely to buy coke from merchants, for which they would have to pay cash on the spot.

Yorkshire Junior Gas Association.—On Saturday, Nov. 20, the Association will visit the Sheffield Gas Company's distribution stores and the Grimethorpe Works. Following the inspection, the President, Mr. S. T. S. Musgrove, of Sheffield, will deliver his presidential address.

Combustion of Carbonic Oxide.—The Gas Light and Coke Company have reprinted, in booklet form, the account of a lecture on the "Combustion of Carbonic Oxide," delivered by Prof. W. A. Bone, D.Sc., F.R.S., at the Company's office on June 24, which was given in the "JOURNAL" for June 30, p. 725.

SOCIETY OF BRITISH GAS INDUSTRIES.

AUTUMN GENERAL MEETING.

THE Autumn General Meeting of the Society was held last Thursday, at the Hotel Cecil, Strand, London, W.C The business proceedings were preceded by a luncheon, at which Viscount EDNAM, M.C. (the President), occupied the chair. By his side was Mr. Frederick J. Gould (the Chairman of the Council); and with them at the top table were Sir Arthur Duckham, K C B.; Prof. Smithells, C.M.G., F.R.S.; Mr. F. W. Goodenough, C B.E.; Mr. R. B. Hodgson; Mr. Cyril G. Davis; Alderman George Clark, J.P.; Mr. F. C. Tilley; Mr. H. J. Donkin; Mr. R. J. Milbourne, J.P.; Dr. E. W. Smith; and Mr. C A. Goodall. Before saying grace, the President said that, being Armistice Day, he would ask those present to stand in silence for a few moments, in memory of the fallen—and particularly of those connected with the Society who died serving their King and country in the great war

At the conclusion of the lunch, there were a few short but forceful speeches. The Loyal Toast having been honoured,

THE PRESIDENT

Mr. F. J. GOULD said it was his privilege, as Chairman of the Council, to propose the next toast—that of "The President." They as a Society had always been fortunate in their Presidents. In the twenty-one years of their existence, a number of distinguished men had occupied the chair; but they had never been more fortunate than at the present time. He knew he was expressing the feeling of them all when he said they were proud to have Lord Ednam as their President. ["Hear, hear."] By reason of the fact that he was a coal owner, he was intimately associated with the great gas industry, with which the Society was bound up. Those of them who had been to Newcastle recently, attending the successful conference of the British Commercial Gas Association (presided over so ably by Mr. John Cowen, and organized so splendidly by Mr. F. W. Goodenough) would quite agree that Viscount Ednam, as the representative of the Society of British Gas Industries, did excellently in every way. This was particularly the case at the various functions which they had to attend. It was quite true that in one speech Lord Ednam modestly denied any knowledge of gas; but as a matter of fact, they were all very pleased with his performance. [Laughter.] They did know, however, that Lord Ednam was a strong advocate of the use of smokeless gaseous fuel, and they might hear later in the day more of what he thought of gas lighting. The day was one of remembrance, and he was minded to tell them something about France. During the past summer, when motoring in his own beautiful West Country, he (Mr. Gould) called at a certain town to see a certain Gas Manager, and this Manager, in conversation, said: "Gould, I should like to congratulate your Society upon having as its President Lord Ednam." He asked: "Do you know Lord Ednam?" And smiling reminiscently, the Manager replied: "Well, you see, I served in France under Lord Ednam. I was a Farrier-Sergeant in the 10th Hussars, and no soldier could wish to serve under a better man or a finer officer."

The PRESIDENT thanked them all from the bottom of his heart for the kind way in which they had received and drunk the toast, but said he could assure them that no toast was ever less deserved. He was afraid that the Chairman of the Council had painted the picture in altogether too rosy hues. Mr. Gould had referred to the list of distinguished Past-Presidents of the Society. At the previous meeting, he (the President) had assured them of the trepidation with which he took over the office, when he looked down the list. It could fairly be said that the Society had had a most excellent list of Presidents, with perhaps only one exception [laughter]; and he would never cease to be sensible of the great honour they had imposed upon him. He was the youngest President they had ever had. He was most undeserving of the position; but he did honestly wish to do everything in his power to enhance the reputation of the Society, and to help them to arrive at the goal which they were all seeking—namely, the still greater prosperity of the gas industry.

TRADE UNIONS AND THEIR PROPER SPHERE.

He feared that the first half, at any rate, of his year of office had been singularly inauspicious. He supposed that the gas industry, in common with every other industry in this country, had never before been through such a difficult period, but he thought that the end of the struggle in the coal fields was really in sight at last. Personally, he was of opinion that the next week or two would see the end of it. They were, however, bound to feel the effects of it for a considerable time. It had been a most damaging period—everybody realized this. It had done the country as much harm as several months of warfare; but he did think in many ways it would have cleared the air. A struggle of this sort was bound to come, and he was not sure that it was not better that it should have come now than later on. "I believe," continued the President, "all of you will agree with me when I say that, after this struggle is over, and we have peace in industry once again, it is most important that the Government of this country should do something to limit the activities of the trades unions to within their proper and legitimate sphere. ["Hear, hear."] I do not think that can be emphasized too strongly. I am the last person in the world to deny that the trades unions perform a most important function so long as they keep within their legitimate sphere; but it is not right that a small minority of trades union leaders should take their orders from Moscow. That has become a very hackneyed phrase, but it is strictly true. It is, after all, at the root of the trouble that the trades unions have got this revolutionary element; and I think that, on this most solemn and important day, when we are thinking of all those millions of brave men who gave their lives for freedom, we should emphasize the fact that we have the right to be free, that we fought to be free, from this rotten revolutionary Russian ideal, which is slowly but surely permeating the whole of our trades union system. I think that on this day, of all days, we ought to make a stand against it, and we ought to make it clear to the Government that we are determined that they shall make a stand against it. As I said, I am the last person to deny that the trades unions have a legitimate function in this country; but beyond that do not let them go, and let us get rid of all this revolutionary talk once and for all. ["Hear, hear."] I wish this Society every prosperity in the coming year."

SERVICES OF THE VICE-PRESIDENTS.

Mr. R. B. HODGSON, proposing the toast of "The Vice-Presidents," said he had a recollection that some little time ago one of his predecessors described the Vice-Presidents as a "respectable lot of

FRED. J. GOULD
Chairman of Council.

gentlemen." He would add to this, by saying they were a respectable and also a distinguished lot of gentlemen. No society had ever been served by more able Vice-Presidents than that Society had been. The membership was composed of engineers and manufacturers; and yet, looking down the list of Vice-Presidents, he found that most of them were gentlemen who were serving in other distinguished positions in life. They were men of whom any Society ought to be proud. He wanted to say, on behalf of the Council, how much they appreciated the services rendered by these Vice-Presidents. Without exception they had helped the Society in every way possible. He coupled with the toast the names of Prof. Smithells and Sir Arthur Duckham.

Prof. ARTHUR SMITHELLS, in acknowledgment, said he must again take the opportunity of thanking the members for their kindness, and of telling them how great a pleasure it was to him to come to the meetings of the Society, of which he had had the great and highly prized honour of being President. There was one principle that had guided him in all his transactions with the gas industry, and that was not to go beyond the limits of his own knowledge. This had been a very happy thing for the gas industry. [Laughter.]

DO NOT MISUSE THE OPPORTUNITY THAT IS COMING.

Sir ARTHUR DUCKHAM also said he was very glad to be present. As he had told them before, he was all the more proud of having been their President in that he was one of themselves. Viscount Ednam might be their youngest President, but he was at the same time probably their most popular President. He agreed with the Chairman of the Council that they all felt very proud of Lord Ednam up at Newcastle. Referring to what the President had said in his speech, he

remarked that many of the "Reds," who were to-day preaching revolution and the shooting-down of people, were conscientious objectors to taking life during the war. As to the future, he was full of hope. He believed that when this long dispute was over there were great times coming for the country and for the gas industry; and he was certain that everything went to show that their manual workers realized that this everlasting talk of revolution and striking was no more satisfactory to them than to the community at large, and were willing to settle down to hard work in the future. "But," added Sir Arthur, "I am quite certain that really happy conditions must depend upon closer association of the employer with the employed—the removal of negotiations from central councils to districts. With these conditions, I am sure we are in for a prosperous time. There must naturally be a boom after this long period of coal stoppage—a time during which money will come in readily; but I do trust the opportunity will not be misused. If the boom were misused, we might have another period of depression which we should all fear." [Applause.]

BUSINESS MEETING.

The business meeting was afterwards held in the hotel—Viscount Ednam (the President) in the chair.

The Secretary (Mr. Arthur L. Griffith) had received apologies for absence from, among others, Sir Dugald Clerk, Sir Robert Hadfield, Lord Riddell, Lord Merrivale, Professor Harold B. Dixon, Mr. D. Milne Watson, Lord Weir of Eastwood, Sir Alfred Mond, Mr. Charles Clare, Alderman F. J. West, Mr. J. W. Broadhead, and Mr. Albert Cliff.

Mr. Frederick J. Gould (the Chairman of the Council) read the following:

Report of the Chairman of the Council.

It is customary at our Autumn General Meeting for the Chairman to give a short report on the Society's work during the past six months.

The Late Alderman Depree.

It is with very much regret we have to record the death of Alderman F. Templer Depree, Chairman of Messrs. Willey & Co., Ltd., who had for so many years been closely associated with our Society, in which he took the greatest interest, and was a past Chairman of the Council. He will be greatly missed in the gas industry. The Secretary, on behalf of the Society, sent a floral tribute and letter of condolence.

The Coal Strike.

The period under review has been full of anxiety, not only to the gas industry and the members of this Society, but to the country generally. The coal strike has dealt our trade such a blow that the loss to the community is enormous—calculated at 400 millions. The loss to the export trade alone is staggering. In 1914 the country was sending abroad approximately 90 million tons of coal; and it is very doubtful if we shall recover a third of this during the next five years.

Gas undertakings all over the country have had a most anxious time, owing to the shortage of suitable coal for carbonization purposes; and they have as a whole earned the nation's gratitude for maintaining supplies in such a crisis. The shortage of coal at home has undoubtedly served to popularize smokeless fuel, which has ensured us a clearer atmosphere than usual at this time of the year.

Many important subjects have been dealt with during the half-year; and as the members are now kept in touch with the work of the Society through the monthly letter after the Council meetings, I propose on this occasion to refer to only a few special matters.

Sir Alfred Mond's Address.

We are much indebted to our Past President, the Right Hon. Sir Alfred Mond, Bart., M.P., for his very able address at our annual meeting in June. This dealt largely with the crisis in the coal industry, and emphasized the need for coal-selling organizations and the necessity of placing the industry on a profit-sharing basis.

We are pleased to note that Sir Alfred Mond is Chairman of the National Fuel and Power Committee set up by the President of the Board of Trade, and that Mr. D. Milne Watson, D.L., and Sir Arthur Duckham, K.C.B., two of our Past Presidents, are members of that Committee.

At the coming-of-age celebrations at Sheffield University, held in July, Sir Robert Hadfield, Bart., F.R.S., one of our Past Presidents, kindly acted as our delegate, and conveyed our congratulations and good wishes.

Universal Smoke Abatement Exhibition, Birmingham.

A very successful exhibition, at which a number of our members exhibited, was held in Birmingham in September. It showed what is being done by the gas industry towards the abolition of smoke. In connection with the exhibition a Smoke Abatement Conference was held, at which a number of subjects relating to this important matter were discussed by leading public men and technical experts. During the run of the exhibition an official visit was paid by the Midland Association of Gas Engineers, when a valuable paper was given by Sir Arthur Duckham on "The Contribution of the Gas Industry to the Problem of Smoke Abatement."

Exhibitions.

This important question, which was referred to by the Chairman at the annual meeting in July, has been under consideration at several Council meetings, and resolutions have now been come to with regard to the co-operation of members of the Society in future exhibitions, which we trust will prove of benefit to all.

Distance Lighting of Gas without the Use of a By-Pass.

This question, which came up at meetings of the British Commercial Gas Association, has been under the consideration of the members of Section VII. They are convinced of the desirability of having such a device, and are of opinion that gas lighting would be very greatly assisted if some such method could be found; but they feel that the task is one for the chemist rather than the mechanical engineer. It has now been decided to approach Leeds University, to see what can be done in research work.

Revision of Railway Classification of Goods.

Messrs. Tweedy & Holt, our Railway Experts at Halifax, have watched our interests at meetings of the Railway Rates Tribunal. Their reports on railway matters are issued in the "Bulletin" and the monthly letters to the members, so as to keep them in touch with these matters.

Railway Rates on Gas Meters.

This matter has been under consideration by the members of Section V., who have had the advice of Messrs. Tweedy & Holt. A satisfactory conference was held with the representatives of the Railway Companies in July, and concessions have now been made by them.

Wrought-Iron Tubing Inquiry.

The Institution of Gas Engineers have drafted a Specification for Wrought-Iron Gas Tube Strip; and at their invitation we have appointed representatives to discuss the proposed specification and matters relating thereto.

Translucent Glassware for Lighting Fittings.

The British Engineering Standards Association are dealing with this question; and we are co-operating with the British Commercial Gas Association in the matter.

Refractories.

The meetings of the Refractories Section of the Ceramic Society were held at Leeds in September, under the Chairmanship of Mr. Frank West, M.I.Mech.E. There was an excellent attendance, including a large number of members of Section X. of the Society, all of whom are members of the Ceramic Society; and some very interesting papers were read and discussed.

It is interesting to note that members of both Societies, among others, contributed papers, as follows:

"Refractories in the Gas Industry," by Mr. W. T. Gardner.

"Practical Results and Experience in the Drying and Burning of Refractory Materials," by Mr. F. West, M.I.Mech.E., and Mr. J. W. Fagan.

"A Further Note on the Influence of Iron Oxide in Promoting the Inversion of Silica," by Mr. W. J. Rees, B.Sc., F.I.C.

"The Influence of Foreign Matter on the Thermal Expansion and Transformation of Silica," by Prof. J. W. Cobb, C.B.E., B.Sc., Dr. H. S. Houldsworth, and Mr. J. F. L. Wood.

The members also visited the University of Leeds, and inspected the Departments of Coal Gas and Fuel and Refractory Materials, and the model gas testing plant.

The report of the Refractory Materials Joint Committee was presented at the annual meeting of the Institution of Gas Engineers in September.

Gas Fire Flues.

Some of our members were approached by the engineer of a well-known gas undertaking on the question of constructional work in connection with gas fire flues. A number of cases had arisen where totally inadequate sized flues had been built in the thickness of the wall, with a view to economizing space. At the same time, the British Commercial Gas Association had their attention drawn to the tendency in some parts of the country for houses to be erected without flues of any kind. They have taken the matter up with the Ministry of Health; and we hope some satisfactory solution will be found.

Section for Makers of Tubes and Pipes.

We have had under consideration for some time the question of forming a section for makers of tubes and pipes. We are of opinion that the demand for this class of material in the gas industry more than justifies the formation of such a section. As the matter is not yet sufficiently advanced, we are asking you at this meeting to authorize, if thought fit, the formation of a new Section, No. XV., for Makers of Tubes and Pipes, and the consequent addition to Rule VI.

Examination Prizes.

The prizes in the City and Guilds of London Institute Examinations in Gas-Works Practice, Gas Supply Practice, and

Gasfitting have been duly awarded, and announced in the Technical Press. The Institute state they are confident that the award of these prizes is an incentive to serious study on the part of their candidates.

In conclusion, I should like to express my best thanks to the Council and members for the support they have given me in our endeavours for the welfare of the Society whose interests we have so much at heart.

ILLNESS OF MR. BROADHEAD.

Mr. GOULD, during the reading of his report, made reference to the fact that Mr. J. W. Broadhead had been suffering from serious illness; and a telegram from the meeting was despatched to him, containing sincere wishes for his speedy recovery.

Subsequently the members were glad to hear from Mr. Wilfrid Drake that, in telephonic conversation with Mr. Broadhead, Junior, two days previously, he had learned that his father was making very good progress towards recovery, and hoped shortly to get into harness once again.

REMARKS ON THE REPORT.

Mr. GOULD formally moved the adoption of the report which he had read.

Mr. R. B. HODGSON seconded this, and remarked that the account which had been given them indicated the various ways in which the Society was proving of use. The Chairman had been most attentive to the work. He had been in constant communication with the Secretary, keeping himself up to date; and the report showed how strenuously he was labouring for the best interests of the Society. Personally, there were only two points raised by the report to which he would like briefly to refer. The first was the stoppage of the great coal industry. He had had the pleasure of being present at the meetings of the British Commercial Gas Association at Newcastle; and he was very much impressed there with what was said regarding the attitude of the gas companies to the present coal shortage. The thing that amazed him most was that, faced by this tremendous crisis, the country had once more been able to rise to the occasion. Within the last six months over 100 million tons of coal had been withdrawn from the ordinary uses; and yet they found in their industry that, so far from there having been any slackening off in the production of gas, there had in most cases been an increased quantity sent out. Apart, too, from the great steel industries, most of the engineering and manufacturing industries of the country had been able to carry on. All this spoke volumes for the British manufacturing community. The other point to which he wished to allude was the proposed formation of Section XV., to deal with steel and cast-iron tubes. The Council for some time past had considered that it was essential that they should add another to the already existing fourteen sections, for the purpose named. They realized that steel and cast-iron tubes were commodities—if he might use the word—which were greatly utilized in the distribution of gas, and so should be suitably represented. The Council had already approached several tube manufacturers, and hoped soon to be able to proceed with the formation of the section.

The report was then unanimously adopted.

SECTION FOR MAKERS OF TUBES AND PIPES.

On the proposition of Mr. HODGSON, seconded by Mr. F. C. TILLEY, it was agreed to authorize the Council, if thought fit by them, to form a new Section, No. XV., for makers of tubes and pipes, and to make the consequent addition to Rule VI.

GAS LIGHTING.

Mr. GOULD then delivered an address upon the subject of "Gas Lighting," of which a report appears below, together with the discussion.

He was heartily thanked for his contribution, on the proposition of Mr. TILLEY, seconded by Prof. SMITHELLS.

STANDARD FOR FLANGES OF CAST-PIPES.

Mr. GOULD said the new standard for the flanges of cast pipes in connection with gas practice had now been agreed upon, and copies of the publication could be obtained from the British Engineering Standards Association, 28, Victoria Street, London, S.W. 1. This was a matter which had meant long negotiations in which the Institution of Gas Engineers and their own Society had co-operated. They would all be glad to know that the matter had now been settled.

THE PRESIDENT THANKED.

Mr. GOULD said he was sure they would not wish to part without according a hearty vote of thanks to Lord Ednam for presiding. [Applause.]

The PRESIDENT said it had been a great pleasure to him to take the chair, and all the thanks of the meeting were due to their old friend Mr. Griffith, who was so efficient in making the arrangements for these affairs, and who so ably looked after their comfort. He would like, therefore, to pass on the vote of thanks to him.

GAS LIGHTING.

By FREDERICK J. GOULD, Chairman of Council, Society of British Gas Industries.

[From an Address before the Society, Nov. 11.]

[The first portion of the paper, which is not reproduced here, was devoted to an historical summary of the introduction and early days of gas lighting.]

GAS BURNERS.

From the seventeenth century, when Clayton pricked a hole with a pin in the bladders he had filled with coal gas, to produce a light, until nearly the end of the nineteenth century, the basic idea of a pin-hole pierced in iron or other metals was the one in vogue for the manufacture of gas burners. These were named "jets," and groups of them were called "cockspurs" or "cockscombs." When two jets were made to impinge upon one another, producing a fan of flame, they were called fishtail and batswing burners; and quantities of these are used at the present time. My own earliest recollection of the development of these burners was the regulated type made by the late Mr. William Sugg, to which was attached a large three-prong gallery carrying an opal moon or globe. This was called the "Christiania" burner; and a most efficient burner it was, part of the Houses of Parliament being at one time illuminated by it. The names of Sugg and Bray stand out prominently in the development of gas burners; and both these names hold an honoured place to-day on the membership roll of the Society of British Gas Industries.

The argand burner quickly followed the flat flame, and in the early 'eighties the inverted argand burner was used to produce the regenerative type of shadowless burner known as the "Wenham." Siemens, I believe, introduced the regenerative system; and Wenhams, Sugg, and others developed it. Up to 1890 this system was largely used in lighting shops, halls, &c., as also was the albo-carbon lamp.

INCANDESCENT LIGHTING.

In the early 'eighties a discovery was made by Dr. Auer Von Welsbach which was to revolutionize gas lighting. It appears that while he was in his laboratory experimenting with some rare earths—having placed them in a vessel with some solution upon the fire—he found that when the liquid boiled over, it evaporated on the ends of the fibres of the ragged edges of an asbestos card supporting the vessel, and that the salts immediately on contact with the flame became luminous. Probably with Clamond's idea (which was to use a metallic gauze or basket on top of a bunsen burner, to obtain luminosity) he conceived the idea of making a basket or mantle saturated with the above-mentioned solution to put over the bunsen flame. The Welsbach mantle and burner were then invented. The mantle fabric is of either ramie yarn or artificial silk dipped in a solution of the nitrates of thorium and cerium, in the proportion of 99 to 1 respectively. When the mantle is burnt off, the nitrates are converted into the highly refractory oxides. By altering these proportions, it is possible to produce actual daylight effects invaluable to textile and other trades where colour matching is required by artificial light.

"The first Welsbach mantle to arrive in this country was brought from Vienna, suspended in a bird cage. The initial methods of manufacture were very crude compared with those in use at the present time; many of the operations now performed by machinery being then done by hand. The mantle made in the early days was supported from the top by a platinum wire attached to an iron side-supporting one, which, in turn, was fixed to the burner. In this form the mantle was sold to the consumer; and in the Welsbach Company's early experience many such mantles were sent for by London Gas Companies by messengers who travelled in cabs—even with a single mantle—in order to ensure the safe arrival of their burden at its destination. The use of the modern collodion to ensure safe packing and transportation, dated from about 1890."

If I remember rightly, the first series of these burners, known as the "C" type, were sold at 21s. each and the mantles at 1s. 3d.

The introduction of the incandescent mantle, which depends for its efficiency upon the temperature of an atmospheric flame (which is very largely a function of the pre-aeration of the gas), was responsible for the change in the official prescription for gas testing—viz., from an illuminating to a calorific standard.

In 1897 Kent experimented with an inverted mantle suspended from a swan neck, and this was quickly followed by the

Bernt and Cervenka patent inverted burner upon which the majority of inverted burners to-day are modelled.

I do not propose to deal with burner construction itself, to which a paper could well be devoted, but will mention two important items in connection with modern gas lighting—the superheater, and distance control.

SUPERHEATER.

This attachment to a gas burner or lamp is a heating chamber fixed between the mixing tube and the mantle. It is usually made of metal, to which the nozzles are attached which hold the mantles. The chamber is heated by the flame below it, which heats and expands the mixture of gas and air passing through it, causing a high flame temperature and therefore increased mantle luminosity. To give an example, an ordinary well-made universal burner, with properly constructed bunsen tube, gas injector, and primary air adjuster, fitted with a large universal mantle and consuming 4 c.ft. per hour of (say) 500 B.Th.U. gas at a pressure of 30 tenths, gives a duty of 120 candles, or 30 candles per c.ft. of gas consumed. Attach to the same burner a superheater to which are fixed three bijou mantles. The burner will consume the same quantity of gas at the same pressure, but will give a duty of 200 candles, or 50 candles per c.ft. of gas consumed. I have here a copy of a hemispherical polar curve showing these results at 65°.

DISTANCE CONTROL.

The present known methods of lighting inverted incandescent burners and lamps from a distance leave much to be desired. The most popular and efficient is the pneumatic switch and valve unit. This is fitted with a push or button switch which can be fixed in any convenient position on the wall. Compression and suction of air through a small tube releases or closes the gas supply, with the exception of enough to feed the attached by-pass tube. These sets are supplied with a protection plate to be fixed immediately above the burner and below the valve, and this should be used in every instance if satisfactory working is to be assured. There are other well-known devices, such as Sugg's automatic lighter; but all necessitate the use of a by-pass flame. Mr. T. P. Ridley tells us that if some means of distance control without the aid of a by-pass could be devised, it would be a great help to our lighting industry; and he is quite right. It is possible that we have not heard the last of the action of gas (or rather the hydrogen constituent of the gas) on platinum sponge. As you all know, this has been tried; but the difficulty was that the platinum quickly oxidized. Overcome this, and your distance lighting is accomplished! I should like to see one of the many able members of Section VII. come forward with some such invention, and earn the gratitude of the whole of the industry, and incidentally make a great deal of money.

STREET LIGHTING.

Street lighting is too large a subject to deal with in an address of this description; but I would like to mention that the majority of streets in this country are lighted by gas, which is the cheapest and best illuminant for the purpose. The Tilley or Keith high-pressure systems are effectively employed in many large cities, including London; but the method generally adopted is to use a 14-in. or 16-in. street lantern fixed to a cast-iron column fitted with a low-pressure cluster superheated burner, to which multiples of bijou or No. 2 mantles are attached.

Mr. H. T. Harrison not long since collected some interesting data relating to the lighting of all classes of streets and roads; reference being made to 5676 miles of streets lighted by 190,078 gas lamps, and 2392 miles lighted by 70,616 electric lamps. It was noticeable that, even in places where municipal electricity undertakings existed, about 73 p.ct. of the street lighting was carried out by gas. This analysis was made by Mr. Harrison in over 119 county boroughs, metropolitan boroughs, and urban districts. His further calculation showed, however, that the great majority of streets were inadequately lighted. He described it as "inferior beacon lighting." Here, then, is a large field for our further activities.

Insufficient attention has been given to street lantern design. I refer now particularly to the character of the polar curve. We get brightly lighted patches, and then a stretch of gloom. We need to get down to the problem, like our electrical friends, of decreasing the diversity factor.

The new type of street lamps with reflecting mirrors set at scientific angles, and which prevent glare, and give the fullest possible diffusion of light, are economical and efficient, and mark another step of progress in this section.

GAS LIGHTING AND HEALTH.

Gas light has been picturesquely described as the sun light of past ages extracted from coal, one of Nature's greatest gifts; and in these days of the growing popularity of the "gas-filled" electric lamp, I do not think that we stress sufficiently the great advantage gas has over the electric lamp, and its relative hygienic advantages. An incandescent gas burner used in a room or office creates ventilation, as an air movement is caused by its drawing upon the oxygen for its maintenance—thus removing vitiated air. It is also a sterilizing agent of exceptional value. Most of our modern hospitals for the treatment of infectious diseases use gas as an illuminant for this reason. Experiments have proved that even spores of bacilli in the atmosphere of a room will be destroyed. One has only to remember that a very large proportion of the air contained in a room lighted by gas finds its way either to the flame or sufficiently within its sphere of action to be thoroughly sterilized before passing away or being inhaled by the occupants.

As you all know, the late Prof. Vivian B. Lewes, F.I.C., F.C.S., conducted a number of experiments in order to find out the truth with regard to this important matter. He says:

> An interesting series of experiments which I have made shows conclusively that, taking an ordinary dwelling room lighted by gas, and then the same room lighted by electricity, the air of the lower portion of the room, if one or two people only are present, is as pure with the gas lighting as with electric lighting; while if a large number are present *the advantages are enormously in favour of gas, the air with electric light becoming rapidly so organically impure as to be positively dangerous to health.*
>
> With the advent of the electric light as an illuminant great stress was laid upon its enormous advantages from the hygienic point of view; and its supporters still make claim that it must of necessity be far more healthful to use as an illuminant than coal gas. It has not unnaturally been assumed that, owing to incandescent electric lighting adding nothing to the impurities in the atmosphere, and—what is quite as important—withdrawing no oxygen from it, it must be the most hygienic form of illumination to employ; *but in the years which have elapsed since electricity was pressed into the service of man for illuminating purposes, it has become perfectly clear that, though it is inactive as regards vitiation of the atmosphere, a gas lighted room will nearly always be more pleasant and healthy to live in than one lighted by the newer form of illuminant.*

The superiority of gas from the ventilating point of view has long been recognized by medical authorities. Dr. W. A. Aiken, writing in the "British Medical Journal" many years ago with regard to the change of lighting of large halls, &c., from gas to electricity, said:

> The atmospheric conditions are now quite different, for the whole contamination is the effect of human exhalations. Such air becomes unfit for respiration much earlier than when carbonic acid alone has to be considered; and the necessary air change is certainly retarded by the absence of gas burners.

GAS LIGHT AND EYESIGHT.

Few things are more vital to good health than good sight; and it is imperative that we protect our eyes from injury. Great danger arises from brilliant unshaded sources of light placed in the direct line of vision. The human eye cannot, without discomfort, endure a greater brilliancy in the source of light which is entering it, either directly or obliquely, than about 5 c.p. per sq. in. of lighting source—viz., about the intrinsic brilliancy of an argand burner or an oil lamp.

The upright incandescent gas mantle has an intrinsic brilliancy of 23 candles to a square inch of source, and therefore needs a diffusing globe of about four times its area to give a perfect light. The inverted incandescent gas mantle has a brilliancy of 40 c.p. per sq. in. of source; but the tungsten electric filament vacuum lamp has a brilliancy of 1100 c.p. Other values are given in Table I.

TABLE I.—*Brightness or Intrinsic Brilliancy of Sources of Light.*

Source.	c.p. per Sq. In.	
Sun	800,000	(A. P. Trotter)*
Searchlight, modern	400,000	"
Electric arc, naked.	20,000	(J. Darch)†
Tungsten electric arc ("Point-o'-Lite")	12,900	(Dr. Thomas and D. Chandler)‡
Tungsten electric filament gasfilled lamp	5,250	(A. P. Trotter)
Flame arc	5,000	"
Nernst (zirconium electric filament) lamp	3,000	(Dr. L. Bell)§
Tungsten electric filament vacuum lamp	1,100	(Dr. Thomas and D. Chandler
Carbon electric filament lamp	400 (average)	"
Gas-mantle, high-pressure, inverted.	250	"
Acetylene flame.	60	(A. P. Trotter)
Gas-mantle, low pressure, inverted.	40	(Dr. Thomas and D. Chandler)
Gas-mantle, low-pressure, upright	23	(A. P. Trotter)
Frosted tungsten electric filament vacuum lamp	10	"
Argand gas flame	7·5	(Dr. Thomas and D. Chandler)
Petroleum lamp flame	4 to 9	(A. P. Trotter)
Batswing gas flame‖	3 to 4	"
Candle flame	2·5	"
Sky (average brightness)	2·5	(Dr. Thomas and D. Chandler)
Moon	2·0	"

* Taken from "Illuminating Engineering."

† Taken from "Trans. Roy. San. Inst.," Vol. XXXI., No. 10.

‡ Taken from "Illumination by Gas"—one of the World Power Conference Papers read in July, 1924.

§ Taken from "The Art of Illumination."

‖ NOTE.—Presumably when burning 16 c.p. gas under the old illuminating power standard.

We have to remember, also, that there is a very real danger in the intrinsic brilliancy of the electric lamp. I have good authority for stating that it has a most harmful effect on the eye, unless it is so obscured as to lose half its power—thus doubling its cost.

Now, Mr. Jacques Abady tells us that the rays of light emanating from an incandescent gas mantle contain a larger percentage of green waves than the rays proceeding from any form of metal-filament incandescent electric lamp. These green rays are extremely beneficial, and the mechanism of the eye is particularly sensitive to them. Tables II. and III. give colour comparisons of various artificial illuminants with daylight.

TABLE II.—*Extracts from Dr. Nichols' Table containing Colour Comparisons of Various Artificial Illuminants with Daylight.*

Colour and Wave-Length.	ILLUMINANT.						
	Daylight (White Sky).	Oil Flame.	Acetylene Flame.	Incandescent Gas Mantle (Low Pressure).	Electric Arc (Plain Carbons).	Electric Incandescent Vacuum Lamps.	
						Tungsten Filament	Carbon Filament.
Red, 65μ .	1·00	1·84	1·38	1·22*	1·15	1 30	1·38
Green, 55μ .	1 00	0·70	0 78	0·97*	0 91	0·80	0·77
Blue, 45μ .	1·00	0·25	0·45	0·70*	0·60	0·42	0·40

* "Old (1894) mantle." A "new (1908) mantle" gave different values—viz., 1·16 0·84, and 0·45 for red, green, and blue, respectively.

μ = one millionth of a centimetre. Some people use the micro-millimetre—*i.e.*, one millionth of a millimetre; and the wave-lengths are then written (for example) 650 μμ.

N.B.—While the experiments of Nichols, as presented by Gaster and Dow in their oft-referred-to work, make available a complete comparison of colour intensities throughout the spectra of various illuminants, there are here given only the relative strengths of three colours (those which are respectively nearest to the three primary colour sensations of the eye), since these measurements are sufficient to enable us—without separately measuring the intensities of all the colours along the spectrum—to infer the composition of the light which proceeds from any source yielding a continuous spectrum.

In an excellent paper entitled "Light and the Eye," which Mr. E. F. Keable, of Gorleston, recently gave to the Rotary Club, and in which he deals with this subject very thoroughly, there are some strong arguments in favour of gas light. Some of the statements he gives made by public men on the subject may be of interest:

Mr. W. M. Mordey, a Past-President of the Institution of Electrical Engineers, said: In the new lecture theatre of the Institution of Electrical Engineers, they had come to the conclusion that they must, at all cost, avoid this terrible whip-lash (or glare) of exposed lights.

"The Electrician," in an editorial article on metallic filament lamps, remarked "that great care will have to be taken if we are not to suffer optically by the abuse of light."

Sir James Crighton-Browne said before the Royal Institute of Public Health "that in two generations, half the people will be blind, and the other half wearing spectacles unless something is done to check the injury to the eyes of children due to the intrinsic brilliancy of electric lamps."

Dr. E. W. Marchant, Professor of Electrical Engineering at the Liverpool University, in a paper said: "In modern systems of electric lighting, it is now becoming increasingly recognized that it is necessary to screen the direct image of the lamp filament from the eye. The intrinsic brilliancy of such a filament (or wire) is very high, and the image formed on the retina is now recognized as producing an unduly severe stimulus, which, if often repeated, may prove injurious."

Dr. Gilchrist, of the Greenock Eye Infirmary, quite recently said that electric ophthalmia appeared to be on the increase, and that it was high time that our eye specialists awoke to the fact.

About the same time, Mr. W. B. Barker, President of the British Optical Association, speaking at the annual dinner of the Association, after commenting upon the great awakening of industrial employers to the question of the visual efficiency of their workers, said: "Visual efficiency in relation to lighting is not limited to industrial employees, and it should be the subject of universal propaganda, in order to stop the use of gasfilled electric lamps unless protected from the eyes. Such lamps are frequently used in homes, shops, offices, schools, and other places in a manner which is an outrage to the organs of vision."

It was the proud boast of a citizen of the United States of America recently visiting London that in his country they had scrapped all gas burners for lighting, using the commodity for cooking and heating, and that the only artificial illuminant was electricity. He was a young man wearing large horn-rimmed glasses; and I am reminded that something like 90 p.ct. of these delightful cousins of ours of both sexes who invade our shores every year wear these disfiguring appliances to improve their sight!

Miss M. Cleaves, M.D. (New York), in her work entitled "Light-Energy," expresses the opinion that "There is no question that the glare of unshaded electric lights is extremely bad for the eyes in house illumination; and not only discomfort, but impaired vision, result from their use."

HOUSING.

Speaking generally of the race for supremacy between the two rival illuminants, gas and electricity, I should say that the former is barely holding its own. Although some towns are largely lighted by electricity, both in the homes and shops, there are many others that are 90 p.ct. gas.

The modern houses built under the Government Housing Scheme are in the majority of cases entirely gas lit. When you have the electrical undertaking municipally owned, you sometimes find the houses designed as all electrical. Such is the craze, regardless of cost and utility, for that which is the more fashionable. Recently, in a large eastern county town, the gas undertaking had the greatest difficulty in persuading the municipality to allow them to make provision to fix a gas washing copper and small cooker, so determined were they to create all-electric houses—utterly unsuitable for the working men and women who had to live in them. In a working-class home that is "all gas," you have the best conditions for thrift and comfort. In the early dark hours of a raw cold winter morning, the housewife goes downstairs to the kitchen living room, and lights the gas burner, thus ensuring warmth and ventilation. She prepares her man's breakfast on the gas cooker, and they eat in comfort and warmth.

Electricity has its uses; but to apply it to the working-class and middle-class home is surely a grave error on the part of any municipal body, especially if they give the current at the ratepayers' expense.

COMMERCIAL VALUES.

The commercial efficiencies of various gas burners and lamps and the relative cheapness of gas as an illuminant are most important points, and Tables IV. and V. prepared by Mr. W. A. Bishop a few years ago will be of interest in these connections.

EFFICIENCY RATINGS.

May I here call your attention to the importance of standardizing efficiency ratings? Can we not generally adopt the practice of expressing the efficiencies of burners and lamps in terms of British Thermal Units per candle-power-hour, mean hemispherical rating? And while raising the point of standardization, I would like to refer to the desirability of standardizing reflector design, with which one could fairly easily embody simple rules for the proper spacing of lamps. On pp. 18 and 19 illustrations are given of three standardized reflectors and curves made by the Holophane Company of the intensive, extensive, and focussing types.

ILLUMINATION.

With regard to gas consumption and the resultant illumination, in dealing with commercial gas lighting there should be available a simple table of working allowances. I am indebted to Mr. W. J. Sandeman for the following:

As regards the order of illumination usual in practice, I find that in our installations the range of illumination, according to the purpose served, is from about 1 to 6 foot-candles. The upper values, 4½ to 6 foot-candles, are considered a "super-effect," necessary where work of a fine character is done. Even these "super" values may be exceeded when local lighting for very fine operations is adopted. In such cases we aim at providing supplementary top-lights (out of the normal range of vision) giving a general illumination of about 0·5 foot-candle, which prevents the contrast between the brightly lighted area under local lamps and the general brightness of surroundings being too severe.

Corresponding to this range of illumination, we have certain convenient allowances in candle power per square foot. It is quite realized that this method of prescribing lighting needs discrimination. Naturally, it is assumed that proper methods of

TABLE III.—*Extracts from Dr. Voege's Table Containing Colour Comparisons of Artificial Illuminants with Daylight.*

Colour.	Daylight.			Electric Incandescent Light.		Electric Arc Light Plain Carbons.	Incandescent Gas Light.	Acetylene Flame.	Oil Flame "Reform" Burner.
	White Sky.	Blue Sky.	Sunlight.	Carbon Filament Lamp.	Tungsten Filament Lamp.				
Red	1·00	0·77	0·90	1·76	1·63	1·35	1·20	1·37	2·18
Green	1·00	1·33	0 85	0·79	0 86	0·97	0 89	0 86	0·74
Blue	1·00	1·65	0·65	0·20	0·23	0·75	0 23	0·27	0·12

N.B.—As in the case of Table II. only the three colours which are respectively nearest to the three primary colour sensations of the eye have been taken from Dr. Voege's table for inclusion here.

shading, &c., are adopted; mere prescription of candle power without attention to this factor would not ensure adequate illumination. Assuming, however, due appreciation of this fact, the "candle power per square foot" basis proves useful. We commonly allow:

	Candle Power per Sq. Ft.
For sufficient light for simple operations	0·4 —0·6
For medium lighting	0·5 —0·75
For bright lighting	0·75—1·0
For very bright lighting	1·0 —1·5

In direct lighting systems these values in general correspond with a range of illumination of from 1½ to 6 foot-candles. It is, perhaps, worth recording that, with fairly large units hung well up and fitted with "Extensive" reflectors, one may assume a resulting illumination on the working plane equal to 4 foot-candles per candle per square foot.

The following table suggests certain values of illumination in foot-candles* for different purposes:

	Foot-Candles.
Foundries	1½—2
Printing works	3—5
Engineering workshops	3—5
Workshop machines, lathes, &c.	3—5
Fine work, watch making, artistic chasing, &c.	7—10
Spinning sheds	2—3
Wood working shops	3—4
Drawing offices	4—6
General ,,	3—4
School rooms	3—4
Churches	2—3

Corresponding to this table are the following specific consumptions which may help in calculating the number and sizes of lamps required to produce definite degrees of illumination:

System of Lighting.	Consumption in Cubic Feet of 500 B.Th.U. Gas per Hour per Foot-Candle per Sq. Ft. of Surface Illuminated.
Direct lighting	0·008
Semi-indirect lighting	0·012
Indirect lighting	0·016

(The value for "Direct Lighting" refers to units of an extensive type.)

I have heard quite a number of people in recent times express the opinion that gas lighting is a doomed industry;

* The foot-candle is the illumination produced by a light flux of one lumen uniformly distributed over an area of one square foot. The lumen represents the quantity of light falling on one square foot of the surface of a sphere of one foot radius from a light source of one candle intensity placed at the centre of the sphere.

TABLE IV.

Type of Burner (Unscreened Sources).	A. B.Th.U. per Candlepower-Hour.			B. Candlepower-Hours per Therm.		
	Mean Horizontal C.P. Rating (I_h).	Mean Spherical C.P. Rating (I_0).	Mean Hemispherical C.P. Rating ($I_\supset$).	Mean Horizontal C.P. Rating (I_h).	Mean Spherical C.P. Rating (I_0).	Mean Hemispherical C.P. Rating ($I_\supset$).
No. 1.—"C" upright	34	45	..	2940	2220	..
No. 2.—No. 4 "Kern" upright	29	38	..	3450	2630	..
No. 3.—Ordinary inverted—large, medium, and bijou sizes	..	..	25	..	..	4000
No. 4.—Twin (No. 1 mantle) pre-heated inverted	..	..	19	..	..	5260
No. 5.—Four, five, and six (No. 2 mantle) preheated cluster inverted	..	..	16	..	..	6250
No. 6.—High-pressure inverted (80 in. w.g.—gas pressure system)	..	..	10·5	..	..	9520

TABLE V.—*Statement of Comparative Costs of Manufacturing Light by Different Methods.*

Method of Manufacturing Light.	Weight or Volume of Material, No. of B.Th.U. and Quantity of Electric Energy Required per Candlepower-Hour (Approx.).	Cost. Pence per Candlepower-Hour (Approx.). (*a*)	Pence per 1000-Candle-power-Hours (Approx.). (*b*)	Candlepower-Hours Purchased for 1s. (Approx.). (*c*)
By (1) candle (ordinary commercial type)	0·017143 lb. (horizontal rating)	0·085715	85·715	140
,, (2) oil—				
(*a*) Domestic wick lamp	0·00119 gall. (horizontal rating)	0·01666	16·66	720
(*b*) ,, incandescent mantle lamp*	0·000216 ,, ,, ,,	0·003024	3·024	3,960
,, (3) town gas—				
(*a*) open flame burner	0·4 c.ft.†	0·01200	12·00	1,000
(*b*) low-pressure upright incandescent burner	45 B.Th.U. (m.s.c.p. rating)	0·00360	3·60	3,333
	34 ,, (horizontal ,,)	0·00272	2·72	4,412
,, inverted ,, ,,	25 ,, (m.h.c.p. ,,)	0·00200	2·00	6,000
,, ,, ,, pre-heated cluster-burner	16 ,, ,, ,,)	0·00128	1·28	9,375
high-pressure (80-in. W.G.) inverted incandescent pre-heated burner	10·5 ,, (,, ,,)	0·00084	0·84	14,286
,, (4) acetylene—				
(*a*) open-flame burner	0·025 c.ft. C_2H_2; or 0·0055 lb. CaC_2 (horizontal rating)	0·01100	11·00	1,080
(*b*) inverted incandescent burner	0·010 c.ft. C_2H_2; or 0·0022 lb. CaC_2 (horizontal rating)	0·00440	4·40	2,700
,, (5) petrol-air gas used in inverted incandescent burner	0·000128 gall. (m.h.c.p. rating)	0·002176	2·176	5,506
,, (6) electric energy—				
(*a*) carbon filament lamp (low efficiency, 800 hours' life type)	4·05 watts (m.h.c.p. rating) equivalent to 13·85 B.Th.U.	0·02025	20 25	592
(*b*) ,, ,, ,, (high efficiency, 400 hours' life type)	3·52 watts (m.h.c.p. rating) equivalent to 12·04 B.Th.U.	0·01760	17·60	682
(*c*) metal filament lamp (vacuum type)	1·25 watts (m.h.c.p. rating) equivalent to 4·27 B.Th.U.	0·00625	6·25	1,920
(*d*) ,, ,, ,, (gasfilled type)	0·66 watt (m.h.c.p. rating) equivalent to 2·26 B.Th.U.	0·0033	3·30	3,636
(*e*) arc lamp (ordinary or plain carbon type)	1·25 watts (m.s.c.p. rating) equivalent to 4·27 B.Th.U.	0·00625	6·25	1,920
(*f*) ,, ,, (flaming or impregnated carbon type)	0·265 watt (m.s.c.p. rating) equivalent to 0·91 B.Th.U.	0·001325	1·325	9,056

* Upright mantle type. A much higher efficiency is claimed on behalf of certain oil-vapour inverted mantle lamps of relatively high luminous output (say, 300 c.p. upwards). These high-power incandescent oil lamps are spoken of in the text.

† 16 c.p. quality—old illuminating power standard. Price (say) 2s. 6d. per 1000 c.ft.

In the table, columns (*a*) and (*b*) have been calculated from the quantities given in the first column, but in certain cases the values in column (*c*) have been determined on the basis of the number of candlepower-hours provided by 1 lb. of candles, 1 gall. of oil, &c., at the listed prices. Since, in the reduction of these values from candlepower-hours per lb. or gallon to the decimal fractions of the lb. and gallon per candlepower-hour, some of the values in the first column have had to be approximated to restrict the number of figures, one or two of the end column values (*c*) will differ very slightly from the tabulated values if one evaluates them on the basis of the approximate quantities in columns (*a*) or (*b*), because, as already explained, the figures in column (*c*) have been derived from the number of candlepower-hours (as mentioned in the text) bought in the form of 1 lb. of candles, 1 gall. of oil, &c.

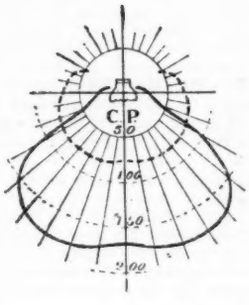
NOTE.—The monetary values in the above table are related to the following fair average purchase prices of the materials and electric energy involved in the light-making processes under review

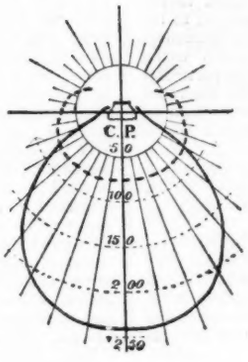
(1) Commercial candles	per lb. 5d.	(4) Calcium carbide	per lb. 2d.
(2) Kerosene oil, flash-point 110° Fahr.	per gall. 14d.	(5) Petrol	per gall 17d.
(3) Town gas	per therm 8d.	(6) Electric energy	per kilowatt-hour 5d.

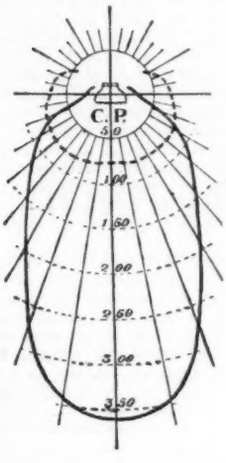
Extensive Type.
For sideway illumination.
Depth 4 in.; width 7 in.

Intensive Type.
For general illumination.
Depth 4 in.; width 7¾ in.

Focussing Type.
For concentrated illumination.
Depth 4 in.; width 8 in.







and some men in the industry itself are taking the loss of lighting as a foregone conclusion. Without vision, nations perish—so it is with industries. Our own at the present time needs to exercise wisely the gift of "long vision." There is a section, which, building too much security upon retaining as a monopoly the future cooking and heating, is in danger of holding too loosely the lighting load at present in its grasp. It is true that at the moment gas holds these fields with no small margin in its favour; but surely no thinking body of gas engineers can sit quietly down and allow the lighting business to slip away because of this apparent security. As men of science, they must give our friends the electrical engineers credit for making every effort in the future to reduce, or even in time reverse, the margin of security which we at present cherish as our own. Some new method—perhaps some new element—may be discovered, so rapid are the strides being made that we may awake one fine morning to find our cooking and heating business in a much keener competition than is at present the case. Therefore, exercising vision to the fullest possible extent, we should hold on to every section of our existing business, remembering that lighting may yet again be a vital plank in our schemes for the future. Why should we let this section drift from our grasp? It is true that it demands considerable thought and attention, but so does everything else worth having.

If we use to the fullest extent the present knowledge we possess as to the comparative effect of gas and electricity upon that vital gift eyesight, and institute a rousing campaign on this issue alone, we shall gather a full harvest in return.

Add to this systematic maintenance of lighting fittings, on popular terms, and extend such systems without delay, condemn the low-priced rubbishy burners and mantles offered, and let the public know about the convenience of a gas switch. Show them some of the many artistic and inexpensive lighting fittings made by many of our members. Then much of the business being surrendered without a fight will be retained and fresh ground will be gained. One cannot condemn too strongly the gas engineer of to-day who does not fight for his existing and for new lighting loads.

In concluding, let me say that much of this totally unnecessary loss of lighting business is due to sheer apathy. If we really want to see our grand old industry, whose history I have only roughly sketched in this paper, still continuing to progress in its second century of service to the community, every gas engineer must be "up and doing," and must pay special care that the canker of indifference does not grow further in connection with this section of our service.

If we are to be defeated in the lighting branch of our business, then let it be fighting to the last ditch. Only by such a spirit shall we prove ourselves worthy to retain the custody of the remaining branches of our public service. For those who are prepared to fight, I am sure a large proportion of the lighting will remain.

Discussion.

The PRESIDENT (Lord Ednam) thanked Mr. Gould for his interesting address, and said they all felt very grateful to him for having taken so much trouble in compiling it. He asked Mr. Goodenough if he would open the discussion.

Mr. F. W. GOODENOUGH said he never realized how modest a man the author was until he heard him claiming for gas lighting the credit for the advance of science, art, and literature, and industry, in the early part of the nineteenth century. They would have to remember in future, in considering the publicity of the British Commercial Gas Association, to claim for the gas industry all Mr. Gould had claimed for it—and, of course, a good deal more. [Laughter.]

FIGHTING FOR THE LIGHTING LOAD.

To his mind, the author was pessimistic in regard to his opinion of gas engineers and managers of the present day. He seemed to think that most of them were surrendering without a fight their lighting load. His information on the matter was, of course, necessarily fairly intimate, as his business was selling lighting fittings; and Mr. Gould was taking a pessimistic view of the attitude of the gas administrators of the country generally. His own experience was that the great majority of them were fighting quite tenaciously for their lighting business. It was perfectly true that there was a very large field for gas lighting still to be retained and obtained—particularly with regard to housing schemes. A great deal of gas lighting was being secured at the present time, and could be secured if the case was put strongly enough to the Housing Authorities, though there were some of them who were so obsessed with the idea that electricity, being the light of the rich, must also be the light of the less well-to-do, and particularly the light of the working classes. There were certain sections of local authorities who took the view that the working woman should have the same lighting as the better-off dweller in Belgravia and the West End—forgetting to consult the working woman herself as to what she really wanted. Of course, what the working woman wanted was the best value for her money; and when she could get both light and warmth for the same penny, she did not want to pay for the two separately. This was one of the great arguments in favour of gas lighting for the working-class home. Especially now that Daylight Saving had been adopted, gas lighting was rarely

wanted, except when warmth also was required. It was the fact that the old halls which had sun burners in their ceilings for lighting were the most comfortable to sit in for (say) a smoking concert or any other large gathering of people. These were very much missed nowadays, when so few halls were ventilated in addition to being lighted. He quite agreed that it would be the height of folly for the gas industry to throw up its hands, and say that the days of gas lighting were over. There was, as he had said, a very large field for gas lighting still; and all of them would be stimulated by the excellent paper they had just heard in their fight to retain such of that field as they had, and to obtain the business that was to be secured in the future.

Mr. J. WILFRID DRAKE remarked that the author had referred to the time when mantles cost 1s. 3d. His own earliest recollection was of paying 7s. 6d.; and he broke three at that price before he managed to get them on the fork. [Laughter.] To assure themselves of the efficiency of gas for outside lighting, they need only look at Kingsway and other centres illuminated by high-pressure lamps, and then compare them with thoroughfares lit with the half-watt lamp.

STANDARD CALORIFIC POWER GAS NEEDED.

There was one thing which was essential in these days to enable them successfully to carry on their competition with electricity, and that was an absolute standard calorific power for their gas. One knew that fluctuations of the calorific power and composition of the gas greatly upset the functions of the burner. Exactly the same thing arose in connection with gas heaters. Getting the flame in proper relationship with the fuel made all the difference in the world to the efficiency of a fire. It was therefore a matter of great moment to the gas industry—he thought, indeed, it was of the greatest moment—that a standardized calorific power should be adopted which would enable the manufacturers to make their appliances for that particular standard. Of course, if pressures varied, there was a great difference in volume as delivered to the appliance; and no apparatus could be made standard which could successfully cope with unequal condition at the point of entry. He strongly urged, therefore, that, if possible, not only a constant calorific value should be given, but a standard value to which everybody could work. If they secured this, they would be in a very much stronger position to meet electrical competition.

Mr. R. J. MILBOURNE said the historical account of the introduction of gas was valuable, though it might have upset some of their notions with regard to Murdoch as the inventor. He had been much interested, when looking through some old patent specifications, to find that Winsor, one of the pioneers to whom the Chairman had referred, was also responsible for the designing originally of the holder, without which, of course, no gas-works could be properly carried on. He would like to take the opportunity of congratulating the Chairman of Council on having made a departure from the usual form of address to which the members were treated on these annual occasions. He had always thought, in a Society of this kind, it would be to the general benefit if the Chairman would select for his subject that part of the gas industry with which he was more particularly associated in his own business. One of their previous Chairmen—he thought it was their respected friend Mr. Broadhead, whose absence from that meeting they deeply deplored—had remarked in his address that it was undesirable, as representing a Society of manufacturers, that they should at the meetings talk about the work which they produced. He (the speaker) did not agree with this. In his opinion, the industry would gain to a considerable extent by the address they had had that day; and he sincerely hoped that subsequent Chairmen would follow the lead which Mr. Gould had given them, and deal with the particular branches of the industry with which they might be associated. They had coming along their friend Mr. Hodgson, who was interested in the heavy section; and no doubt the hint now thrown out would relieve him of the necessity of wondering what subject he should take for his address when, in a year's time, he occupied the chair.

Mr. F. C. TILLEY, proposing a hearty vote of thanks to Mr. Gould for his address, said it had been particularly interesting as showing how far they had travelled in the way of gas lighting since the time of its introduction. His (the speaker's) own firm dated back practically to the very beginning of gas lighting. In 1818 they fitted up with flat-flame burners the first church that was lighted by gas in London—St. Mary's, Haggerston—and since that time they had been, for five generations, continuously engaged in gas lighting. In the early days, when iron burners were used, and the charge for gas was per burner, many people had a great fear of gas lighting, and better-class installations were carried out with copper piping, and the cock controlling the gas supply was never put too near the burner (which usually stood on a pillar), lest an explosion might be caused. Now, of course, they all knew that this fear was quite groundless. In his early days, he carried out experiments to ascertain in what way gas lighting could be improved; and he found that by taking a bunch of calcined fish bones, and suspending them over a bunsen flame, it was possible to obtain a considerable amount of light. This happened in the days before the discovery of the gas mantle; but he did not persevere, or they might now have been able to say that the mantle was first produced in England, instead of by their German friends. Mr. Drake had stated that he remembered a price of 7s. 6d. for mantles; but for the first mantles he (Mr. Tilley) bought he paid 15s. each, and had the greatest difficulty in getting them, even at that price. But it was not long before they got down to 7s. 6d., and later on the figure got to 1s. 3d., which remained for a considerable time. The sun burners which had been referred to by Mr. Goodenough were in his own young days regarded as the best form of illumination for large areas; and he spent a good deal of time in fitting them.

DISTANCE CONTROL.

Distance control had been mentioned as one of the means by which they could retain gas lighting. He agreed; but it was a most difficult problem, and one that had been considered by lighting engineers for many years. Though there were one or two systems, it could not be said that they did all they would like them to do. However, with the encouragement that Mr. Gould had offered, and with that which they should get from the National Gas Council and the British Commercial Gas Association, there was no reason why engineers should not further tackle this subject, and thereby bring about another great step in the progress of lighting. ["Hear, hear."] Mention had been made of the attitude of gas engineers and managers towards gas lighting. His own opinion was that to-day these gentlemen were very much more enthusiastic in their support of gas lighting than was the case five or six years ago. There was a time when it proved quite difficult to interest a great number of gas engineers and managers in gas lighting; but they had now realized—and Mr. Goodenough had done a great deal to bring this about—that the lighting load was worth having. He hoped the association between those who were still experimenting for the improvement of gas lighting and those who were in direct touch with the public would continue to grow closer, with beneficial results to them all. Mr. Drake had alluded to the necessity for a standard gas, and in doing so had voiced what had been felt for many years. Doubtless there would be difficulty in producing a standard gas; but he did hope that this aim would be persevered in. He (Mr. Tilley) was endeavouring to devise a burner for an apparatus which was required to be used all over the country, and yet to give a constant temperature. Now, for the same burner to give a constant temperature wherever it might be used, with the various calorific power gases that were to be found, presented a very difficult problem indeed; and though he believed he was well on the way to designing such a burner, it had been not at all an easy thing to do. Those interested in the appliance were insistent that it should be perfect, and not give the slightest trouble to the user, because it would mostly be employed in out-of-the-way places, where a gas engineer would not be constantly available to make adjustments, and it was also in competition with the electric element, which gave a constant heat.

Prof. ARTHUR SMITHELLS seconded the vote of thanks, and remarked that he had been a fellow student of Von Welsbach, though he did not actually see the spilling of the liquid in Bunsen's laboratory which led to the discovery of the gas mantle. He had also known Mr. Bray, Senior, who was a wonderful man, and his son, whose death was a serious blow to the gas industry. In fact, the subject of the address was one on which he could speak at any length, for his memory went back so far. But to confine himself to a particular point, he would say that, of all the problems that faced the gas industry from the point of view of lighting, he did not think any exceeded in importance—if any equalled it—the question of distance control without a by-pass. He mentioned this, not only because he believed it to be exceedingly important, but because it was a matter on which he might perhaps give a little hope.

HOPE OF SUPERSEDING THE BY-PASS.

Any lighting device which was to be used not in connection with a by-pass must be something of the nature of platinum, which had hitherto failed. Now, however, they all knew the blessed word "catalyst," which had become almost a common term, because so many of their industries had been transformed, and some had been even created, by the use of what were called catalysts. Catalysts were of the same order, chemically speaking, as the platinum which caused ignition of coal gas and air; and it was only now that there seemed to be any progress towards the understanding of their action. It had something to do with surfaces. He did not wish to offer any facile prophecies; but he should say that there was now, at any rate, a better hope than there seemed to be some time ago that they might at no distant date be able to supply what was so greatly desired by the gas industry—an element which, in comparison with electricity, it at present lacked.

Mr. PHILIP SUGG expressed his appreciation of the address, and of the many services that had been rendered to the Society by Mr. Gould, as Chairman of the Council.

The PRESIDENT added that Mr. Gould had spent much time—how much, it would astonish them to learn—in compiling a record which would be of value both to the Society and to the industry.

Mr. GOULD, acknowledging the vote, said there appeared to be no points in the discussion to which a reply was needed; but he would like to draw attention to what he actually stated towards the end of his address: "One cannot condemn too strongly the gas engineer of to-day who does not fight for his existing, and for new, lighting loads." He merely said this to point a moral, because such engineers did exist. They were in a minority; but it was this small proportion that they wanted to tackle.

The Coal Handling Plant at Beckton.—In the issue dated Nov. 12, "Engineering" commences the publication of an illustrated description of the new coal handling plant at the Beckton Works of the Gas Light and Coke Company, constructed by Messrs. Fraser & Chalmers' Engineering Works, Erith. The work is still proceeding, though the major portion of it is completed, and was formally opened by His Majesty the King on July 10 last. The writer of the description, in his opening paragraph, remarks that the rapid and widespread development of the gas industry is seldom brought to the notice of the ordinary man unless some new gasholder rises to attract his attention; but to the engineer other signs are equally, and perhaps even more, significant—and such an index of progress may be seen in the new coal-handling plant.

SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

GENERAL MEETING IN LONDON.

FULL of interest and well attended was the autumn general meeting of the Association held on Friday last at the Hotel Cecil, Strand, London, W.C., under the presidency of Mr. ROBERT ROBERTSON, of Bristol. Two papers were presented and fully discussed; and a number of Past-Presidents received mementoes of their period of office, in the form of medals

APOLOGIES AND GREETINGS.

As soon as the members had taken their places,

The PRESIDENT announced the receipt of a number of letters of apology for absence; the writers including the President of the Institution of Gas Engineers, and the Presidents and Secretaries of various District Associations. Mr. Wilkinson wrote: "I am quite sure you will have an interesting meeting; and I trust there will be a good turn-up, despite the difficult circumstances in which gas engineers are working at the present time." On behalf of the members, he heartily welcomed Mr. C. S. Shapley, of Leeds, the President of the Manchester District Institution of Gas Engineers, and first President of the Institution of Public Lighting Engineers. They were also pleased to have with them their old colleague Mr. W. P. Tervet. [Applause.]

Mr. C. S. SHAPLEY (Leeds), during the proceedings, thanked the President for his kind welcome, and said his cordial reception as the President of the Manchester District Institution would be much appreciated by the members of that organization.

MINUTES CONFIRMED.

The PRESIDENT then proposed, and it was agreed, that the minutes of the last meeting as published in the "GAS JOURNAL" should be taken as read and confirmed.

THE NEW PRESIDENT.

The PRESIDENT remarked that a year ago it had been his privilege to propose as their Vice-President one of their number whose record was unique, in respect of the magnitude of the works which he controlled, in respect of the variety of ways in which he had served the gas industry, and in respect of the esteem, confidence, and affection with which he was regarded by every one of his colleagues. ["Hear, hear."] He referred to Mr. Thomas Hardie, Chief Engineer of the Gas Light and Coke Company. In now proposing Mr. Hardie as President, he felt a pleasure which he knew was shared by every member, because of the warm feelings they entertained towards Mr. Hardie, because of the satisfaction which always came from seeing tools pass into the hands of a man who could use them, and because of the knowledge that with him as President the prestige and usefulness of the Association would be enhanced.

Mr. C. VALON BENNETT (Rochester), who seconded the proposition, expressed the opinion that the Association was to be highly congratulated upon having for President a man like Mr. Hardie, who, as they all knew, possessed in abundance all the attributes necessary for such a position, having at one time been President of the Institution of Gas Engineers.

The resolution having been carried with acclamation,

Mr. THOMAS HARDIE (London) returned thanks for the honour done him in electing him President of so important an Association. He was afraid, however, that he could not lay claim to many of the qualities with which Mr. Robertson had endowed him. Since he came South, one of the things which had most impressed him had been the very kindly reception which he had been accorded by engineers in this part of the country; and that day they had emphasized this by making him their President. He could only say that he appreciated the honour very much indeed, and that he would do his best in carrying out the duties pertaining to the office.

THE VICE-PRESIDENT.

Mr. HARDIE (continuing) said it was his pleasure to move that Mr. C. Valon Bennett, Engineer of the Rochester, Chatham, and Gillingham Gas Company, be elected Vice-President for the coming year. Mr. Bennett had been a very regular attendant at the meetings, and had taken the greatest interest in the work of the Association. He would undoubtedly prove an excellent Vice-President.

Mr. J. WESLEY WHIMSTER (Bath) seconded the motion, which was heartily agreed to.

Mr. C. V. BENNETT, in the course of his acknowledgment, said he had always looked upon the Southern Association—if he might say so without hurting the feelings of the members of any other Association—as "the" Association connected with the gas industry. He had always endeavoured to attend the meetings both of the Association and of the Eastern Commercial Section, because of the information he was able to gain. In saying this, he felt sure he was echoing the general opinion.

GENERAL COMMITTEE AND DISTRICT COMMITTEES.

The HON. SECRETARY (Mr. H. C. Smith, of Tottenham) read out the following list of elections of district officers and members on the General Committee for 1927:

Eastern District, 1927.

Chairman.—Mr. C. Valon Bennett.
Vice-Chairman.—Mr. A. W. Sumner.
Hon. Secretary.—Mr. L. Trewby.
Committee.—Messrs. A. H. Andrews, W. H. Bennett, A. Caddick, T. Carmichael, G. M. Gill, L. G. Humphrys, S. Lacey, L. J. Langford, C. T. Price, R. H. Ruthven, C. H. Rutter, F. Smallbone, J. Terrace, J. S. Thorman, J. Urquhart, and W. H. Warren.
Representatives on the General Committee in place of those retiring by rotation.—Messrs. T. Carmichael and J. Terrace.

Western District, 1927.

Chairman.—Mr. J. Hughes Cornish.
Vice-Chairman.—Mr. W. E. Dean.
Hon. Secretary.—Mr. J. B. Cattle.
Committee.—Messrs. J. Armstrong, C. G. Dawson, S. E. Halliwell, H. Higham, P. S. Hoyte, J. Harger Pye, H. E. Riley, C. Stapleton, James Taylor, A. Thomas, H. W. Versey, E. P. Vince, and J. Wesley Whimster.

No representative on the General Committee due to retire in 1927.

HON. AUDITORS AND HON. SECRETARY.

On the proposition of Mr. J. M. CAMPBELL (Margate), Messrs. James Donaldson and John Urquhart were re-elected Hon. Auditors.

The PRESIDENT said it was essential with an association of this kind that the secretaryship should be a permanent job. Mr. Smith possessed in a superlative degree all the qualifications necessary; and he was sure the affairs of the Association could not be in better or more capable hands. He therefore proposed his re-election as Hon. Secretary.

Mr. T. CARMICHAEL (Portsmouth) seconded the proposition, and it was unanimously agreed to.

NEW MEMBERS.

The HON. SECRETARY then read the following list of new members, whose names had been considered by the General Committee, and were recommended to the meeting for approval:

Mr. Charles Bateman, Bath.
Mr. Albert Marcus Stephenson, Watchet.
Mr. James Robert Bradshaw, Devonport.
Mr. Kenneth Charles Gandon, Hornsey.
Mr. Percy Hulme Hornby, Southall.
Mr. John Ernest Ledingham, Tottenham.
Mr. Gardner Pennington, Sittingbourne.

The PRESIDENT remarked that it was a pleasure to propose the election of these new members. It was gratifying to know that the number of members was increasing, thus augmenting the strength of the Association. He knew some of these new members personally, and felt confident that they would be an acquisition.

Mr. HARDIE seconded the motion, which was agreed to.

PRESENTATION OF CERTIFICATES.

The PRESIDENT said the next duty he had to perform was to present certificates to successful candidates in the Higher Grade Examination in Gas Engineering of the Institution of Gas Engineers. It was gratifying to meet those who were coming into the industry; and they would all wish them every success in the profession which they had taken up. The candidates receiving the certificates were:

Mr. N. V. Clarke, First Class.
Mr. L. G. Kimmins, Second Class.
Mr. J. Kirkhope, Second Class.
Mr. M. Walker, Second Class.
Mr. G. H. Watson, Second Class.

PRESENTATION OF MEDALLIONS TO PAST PRESIDENTS.

The PRESIDENT, referring to the next item on the agenda, said: The very pleasant duty now devolves upon me of asking Past Presidents of the Association, who served in what may be referred to as the "Pre-Salver Era," to accept as mementoes of their terms of office medallions which have been struck for the purpose. It is said that 2000 years ago the Chinese Emperor Shih Huang Fi ordained that any of his subjects who should make use of the past to belittle the present should be put to death with his relatives, and enacted, further, that all historical records should be destroyed—thus putting temptation out of the way. But I feel certain that even Shih Huang Fi would not have taken exception to what we are doing to-day, for we are simply following a peculiarly British custom of recognizing service, with a certain time-lag intervening. The

idea owes its inception to Mr. Leonard Langford, one of the first Presidents of the "Salver Era." Notwithstanding his robust physical component, Mr. Langford has a very tender heart; and the lively feelings of pleasure which he experienced when he received his salver, reacted in a feeling of keen sorrow for those less fortunate Past Presidents whose terms of office had not been so commemorated. So he raised the question of whether something could not be done to remedy this. The matter was taken up enthusiastically by the Committee; and I need hardly say that no objections were raised by those members who were Past Presidents. These medallions are the result.

The jubilee celebrations provided an occasion for compiling a chronological list of Past Presidents—a labour of love undertaken by the Hon. Secretary—and this proved a very interesting feature of a very interesting commemoration brochure, presenting as it did, in an unbroken succession of Presidents whose names are household words in the gas industry, a microcosmic history, not only of the Southern Association, but of the industry itself. All of them were identified with the forward movements of their day, and many of them initiated movements, and led where others followed. And their acts, and all that they did, are they not written in the "Transactions" of our Association? Time, alas! has made many gaps in their ranks. Some have passed "the bourne whence no traveller returns." Some have retired from active service. But we rejoice to know that many of those whose names are in that roll of honour are still carrying on. We are delighted that so many are here today; and in handing over these medallions, I wish, on behalf of every member of the Association, to express the earnest hope that they may serve to remind the recipients of what I am sure is in every case a very happy memory, rendered all the happier, I hope, by the sincere appreciation of their colleagues of which these medallions are the symbols.

We have had the following letter from Dr. Carpenter:

Nov. 11, 1926.

Dear Mr. President,—I greatly regret it will not be possible for me to fulfil my intention of attending the meeting of the Southern Association to-morrow, as I am recovering from the effect of ptomaine poisoning, and my super-careful doctor prefers me to stay in rather than go out.

It is very disappointing to me, for my indebtedness to the Association is a considerable one, and I was looking forward to the opportunity of making due acknowledgment.

With best wishes for a very successful gathering,

I remain,

Dear Mr. President,

Yours very truly,

Charles Carpenter.

We have also had other letters of apology for absence; and I have been personally requested by my old Chief, Mr. Daniel Irving, who was President some 25 years ago, to convey his sincere regret that illness prevents him from coming here today. Mr. Irving wishes the Association continued success, and he asked me to hand his medallion over to his son, Mr. Douglas Irving, who we are pleased to know is one of our own members.

The following are the Past Presidents for whom medallions had been provided; and an asterisk is placed against the names of those who were present at the meeting to receive the memento in person:

Year.	President.	Year.	President.
1893	C. C. Carpenter	1912	B. R. Green
1898	R. Beynon	1913	*H. O. Carr
1899	*A. E. Broadberry	1914	Thomas Glover
1900	D. Irving	1915	*J. W. Auchterlonie
1902	*W. E. Price	1916	*W. Doig Gibb
1904	*D. H. Helps	1917	*W. N. Westlake
1905	S. Carpenter	1918	*W. B. Farquhar
1906	F. W. Cross	1919	*Frank Livesey
1907	*H. W. Woodall	1920	*C. F. Botley
1908	N. H. Humphrys	1921	*J. Wesley Whimster
1909	*J. Paterson	1922	*J. M. Campbell
1911	*H. C. Head		

The President asked Mr. Broadberry, as the senior of the Past Presidents present, if he would say a few words.

Mr. A. E. Broadberry thanked the members, on his own behalf and on behalf of any of the other Past Presidents who did not wish to make a speech, for the handsome souvenirs of their year of office as President of the Association. His own medallion carried him back a great many years; and during all the intervening period he had been proud of being a Past President of the Association. The fact that he had occupied the chair had, he was sure, been helpful to him in his career, and had been an incentive to him to do the best he possibly could for the industry which had conferred this honour upon him. He felt that these sentiments represented the feelings of all those who had received the medallions. He would preserve his with a great deal of pride; and he hoped that for many years more he would be present among them.

Mr. W. E. Price remarked that the souvenir, in his case, was a happy reminder of, he thought, getting on for twenty years' official connection with the Association—first of all on the Committee, then as President, after that for some few years as Hon. Secretary, and finally as Auditor.

Low Temperature Carbonization and the Gas Industry.

Dr. E. W. Smith then read a paper on "Low Temperature Carbonization and the Gas Industry," which, as will be seen from the report appearing elsewhere in this issue, led to a full discussion. In presenting it, Dr. Smith said the paper had been made deliberately short, and free from technical description of individual processes, in order that a general discussion of low-temperature carbonization as it affected the gas industry could take place.

The President proposed a hearty vote of thanks to Dr. Smith for giving so valuable a paper.

Mr. Hardie seconded, and congratulated the author on his clear statement, which brought up to date low-temperature processes as they existed in this country. They had also had a good discussion, which had shown many of them to be of the same mind. He (Mr. Hardie) thought they had to look at low-temperature carbonization from many points of view. There had been more work done on it in recent years than on almost any other form of carbonization. Gas undertakings were anxious, if there was anything in it, to take hold of it; and they were willing to expend money in improving any system which showed likelihood of success.

Corrosion.

Mr. R. H. Ruthven, of Ramsgate, contributed the second paper, which dealt with "Some Phases of Corrosion," and was also followed by a lengthy discussion. [This is unavoidably held over.]

The President, in proposing a hearty vote of thanks to Mr. Ruthven for his paper, said the members were under a debt of gratitude to him for having devoted so much time to its preparation—particularly during a period when he was undertaking big works extensions, which must have made heavy demands upon him.

Thanks to the President.

Mr. J. W. Auchterlonie (Cambridge) remarked that a great deal of the success of the meeting had been due to the President; and he proposed a hearty vote of thanks to Mr. Robertson. The meetings of the Southern Association had always been particularly valuable; and their high standard had been not only maintained, but enhanced, by the President.

Mr. W. N. Westlake (Exeter) in seconding, made appreciative reference to the President's charm of manner, eloquence, and wealth of humour. He had carried out the duties of President in a manner which had upheld the credit of the Association and had endeared him to the members.

The President's acknowledgment brought the proceedings to a close; and the members then took tea together.

STOPPED PIPES THE BAR TO PROGRESS.

The practice of horizontal retorting, though over a hundred years old, has been in more than one instance arrested in its full development by the bugbear of stopped ascension pipes. No sooner did improvements in the design of settings and in refractories admit of higher-temperature carbonization, than a series of stopped-pipe troubles gave pause to the progress made. Hence a peculiar interest attaches to a new gas offtake pipe (Patent No. 260,398).

This offtake pipe, instead of being an "ascension" pipe, is a "descension" pipe; and for it many interesting points are claimed, viz.:

The crude gas is continuously scrubbed and shock-cooled by liquor sprays as it descends from the hot bench brickwork to the cooler cellar, whereby, for the first time, the hot bench top is entirely freed from mountings, so that the foreman's duties are facilitated.

Stopped pipes are completely prevented, thereby permitting of higher heats and bigger yields.

No smell of ammonia, as no free ammonia is present, this being retained in the gas till the condensers are reached.

The valve to each retort is of the self-cleaning, self-centring, mushroom type, ground to its seat at any time (*in situ*) by a square shank projecting into the self-sealing mouthpiece. Each valve is mounted on a detachable flange, so that the whole can be readily withdrawn.

Expansion is provided for in perfect manner.

Each valve is held in open and closed positions by an external spring, and hence is self-adjusting.

Each mouthpiece is bolted to each segment of the scrubber-pipe. The valve in the open position is continuously washed by the liquor spray; hence all pipe cleaning is saved.

The separate portions of the scrubber-pipe are jointed by a small lute or socket, whence expansion is not cumulative, but is absorbed at each mouthpiece.

After the bench has been fully expanded by heat, the sockets may be jointed in the usual manner.

The minimum area of each scrubber-pipe is 100 sq.in., the equivalent of an 11-in. diameter pipe.

LOW-TEMPERATURE CARBONIZATION AND THE GAS INDUSTRY.

By E. W. SMITH, D.Sc., F.I.C.

[A Paper read before the Southern Association of Gas Engineers and Managers, Nov. 12.]

All branches of the subject of carbonization are of intense interest to gas engineers. Low-temperature carbonization appears to have had a fascination for the technical man for many years; but it should appear to the general public remarkable that, with all the interest that has been shown in this direction, with all the work and development that have taken place, there has, so far, been no satisfactory low-temperature carbonization process developed to a state of commercial perfection in connection with any existing gas undertaking.

It should be obvious to the man in the street that if there is any commercial advantage to be gained through either low-temperature carbonization or any other process which may fit in with the operation of town gas production, then gas engineers, with their sound commercial industry behind them, would be among the first to adopt such processes. This does not mean that gas engineers have taken no interest in this subject. From the earliest days of its development, gas engineers have been closely associated with every phase of the work that has been done; and it may be stated with truth that it is because of this intimate knowledge, not only of the national requirements for fuel, but also of the economic conditions governing such national requirements, that gas engineers have not so far been prepared to "father" any process that has been put forward.

To get down to a real understanding of the present situation, it is necessary to analyze the position in a most fundamental way. In the first place, what is meant by low-temperature carbonization? Roughy speaking, it can be stated that experimentalists have found that, by heating coal to a considerably lower temperature than is normally used in connection with high-temperature carbonization processes, there are produced a solid residue which contains from 4 to 10 p.ct. of volatile matter, and an increased quantity of tars or oils over and above that normally obtained from high-temperature processes. These effects are very interesting; and in view of the fact that there is a general trend towards the disuse of raw coal for domestic purposes, there is every justification for the development of any process which will eliminate the disadvantages of raw coal.

SOLID SMOKELESS FUEL.

We must ask ourselves, therefore, what are the disadvantages of the raw coal. One advantage is that it is cheap; another that it gives the kind of domestic fire which is acceptable to the average householder. The disadvantages are that the use of raw coal means waste of bye-products in the form of tar, oils, motor spirit, scents, medicines, dyes, road tar preparations, fuel oil, sulphate of ammonia, cyanide, and sulphur. It follows, too, as a consequence, that the atmosphere is polluted with an aerial sewage which is the direct cause of enormous expense in maintenance, personal and communal. It is also the direct cause of most of the ailments and undervitalized conditions of the majority of the community. There is every reason, therefore, why the use of raw coal for domestic purposes should be taboo, and there is every justification for trying to find a substitute. Whether this substitute should take the form of a solid smokeless fuel, or some other form, such as gas or electricity, is a matter which has not yet been unanimously decided.

However, one factor has always to be borne in mind—that of cost. If the process of either high or low temperature carbonization can produce a substitute for raw coal which, taking everything into account, will cost little more than raw coal, and give a profit in its production which will attract capital—I mean the investor rather than the speculator—then the process will be assured of success. This has been proved to be the case in a most overwhelming way as instanced by the gas industry. The use of gas in the form of gas fires for house heating, and for cooking, in which there has been a direct replacement of raw coal in every case, is ample evidence of this fact. It is also evidence of the fact that, in spite of the fuel cost being higher than that of the coal which it has substituted, there are other advantages of direct financial value which far outweigh the difference in the cost of the heat units purchased.

The qualities that are required in a solid smokeless fuel are:

1. It shall be smokeless.
2. It shall be clean in use—namely, free from dust, and free from trouble as regards lighting and convenience.

It has been amply demonstrated that by means of low-temperature carbonization a solid smokeless fuel can be obtained with which, if sufficiently low-ash coals have been used in the first instance, and if the temperature of carbonization has been sufficiently high, a real improvement on the use of raw coal can be assured. It is therefore important to recognize that solid fuels, high in volatile matter, produced at low temperatures, are not as smokeless as they must be if they are to give real satisfaction. It must also be recognized that fuels that have been produced on a small scale, from a selected colliery, cannot be taken as being representative of what would be produced in a general way on a scale which would materially satisfy the demands of the consumers, who are absorbing approximately 40,000,000 tons of domestic coal annually.

COKE QUALITY.

Gas engineers in recent times have had no difficulty in selling for domestic purposes the solid smokeless fuel which they produce at high temperatures, and which is known as coke. Such coke is made under high-temperature conditions, but not over-coked. When such fuel is dry and properly graded for the purpose, results can be obtained at least equal to those obtained from the solid fuels produced at low temperatures. But a great deal more requires to be done, both in research and in development of the factors I have enumerated, before it can be stated that the gas industry generally is producing a satisfactory substitute for raw coal—a substitute which is equally as good as any other solid fuel made at low temperatures from the same coals. Over-coking is an important factor in this respect. Useful research could be organized which would indicate the extent to which gaseous therms are lost through leaving in the coke various percentages of volatile matter. I am of the opinion that the last 3 p.ct. of volatile matter may prove to be of less value as gas than the enhanced price that might be obtained for coke containing this volatile matter.

One hears gas engineers and others occasionally say that coke, in their view, is really not satisfactory as a substitute for coal; but my experience is that in every case they have not had the opportunity of testing what can be obtained by modified methods of coke treatment, which methods are standard practice in a large number of gas undertakings.

GAS-WORKS AND LOW-TEMPERATURE CARBONIZATION.

Let us come back to the question of low-temperature carbonization.

Another argument that is used in favour of low-temperature carbonization is that oil is a national necessity, and that American oil is petering out, or likely to do so in the next fifteen years; and that its price will rise to such an extent that from the point of view of our navy, in particular, it is essential that new processes shall be developed, having for their primary object the production of large quantities of oil.

I am endeavouring to look at this subject entirely from the point of view of the gas industry, rather than from that of national requirements in other directions—unless it can be shown that, by supplying other national requirements than those already supplied by the gas industry, it will have the effect of at least reducing the cost of production of the main product, gas.

It is quite conceivable that if a process of low-temperature carbonization can be shown to be a profitable one, but one which is not at all necessary in the general economy of gas undertakings, nevertheless, it would pay gas undertakings to develop such a process, if by so doing the profits from that process would have the effect of reducing the price of gas. Undoubtedly gas undertakings could make any suitable process of low-temperature carbonization pay with greater ease than if such processes were run apart from gas undertakings or coke oven plants, because the gas produced, and some of the other residuals, may readily be absorbed by the undertaking. Then such a process would be in the same category as electricity generation on a gas-works, where the raw coal is used for a different purpose from that of gas-making solely, and the exhaust steam from the generators can be utilized in the production of water gas. That, however, would be quite outside the general run of gas manufacture; and unless a profit were made, it would not be justified.

I can imagine that someone will say: "Yes; but you are begging the question. It is not suggested that the best place for carrying on a low-temperature carbonization process is the gas-works. It is only suggested that the cheap slacks available at the pit mouth, free from carriage and railway rates, shall be treated by means of low-temperature carbonization, and that in such circumstances the value of the fuel produced may be three or four times the value of the original coal." My reply would be that, although there are a few low-ash slacks, which are cheap, and suitable for the low-temperature process, the majority of such slacks which are known to be available, if low in ash, are not cheap, and, if high in ash, are not of any use, without washing, for the production of a domestic fuel.

One swallow does not make a summer; and the fact that a success may have been achieved on a comparatively small quantity of coal of a specialized and most suitable kind does not mean that such a process would necessarily be remunerative and technically successful, if generally applied on many gas undertakings.

FUNDAMENTAL REQUIREMENTS.

I do not think any good purpose will be served by review-

ing the leading low-temperature carbonization processes, and passing them under criticism. It has been my duty to have to examine thoroughly, from a contracting point of view, the large bulk of them; and I have not yet met with a process of low-temperature carbonization which will satisfy the requirements that I have laid down as fundamental. These may be enumerated as follows, in the form of questions:

1. Will the process show a profit when a large number of plants have been erected, and when the market for the residual solid fuel and the bye-products has become stabilized?
2. Can the adoption of the process be shown to be of advantage, either by increasing flexibility or by reducing overall costs in the operations carried through by gas undertakings?
3. Is the process technically sound?

Appended to this paper will be found a table which enumerates a number of the better-known processes, together with the characteristics of such processes. This table, if studied, is self-explanatory; and the advantages and disadvantages so far as the gas industry is concerned can be deduced from the data shown. The most promising of the developments that have taken place, so far as the requirements of the gas industry go, would appear to me to be that which is to be found at the Fuel Research Station, East Greenwich. I do not suggest for one minute that I have any evidence that the process can be proved to be economically sound in any general way; but it appears to be running continuously, and the capital cost per ton of throughput would seem to be much lower than that of any other plant I have seen. It would appear to me to be a system which is worthy of extended trial on a larger scale; and by that means, and by that means only, can it be demonstrated whether or not the process is economically sound. I am a pessimist in this respect, but would gladly acclaim its proved success, should this occur.

POSITION OF THE GAS INDUSTRY.

It is sometimes suggested that one of the big advantages of low-temperature carbonization to a gas undertaking is that the high quality gas produced would have an enhanced value as an enriching agent for lower grade gas. This depends entirely on the credit that is given for such gas; but a great deal would be required to be of any material assistance to most gas undertakings, as the calorific value of the gas is not sufficiently high to be of any material assistance except in relatively large quantities. More and more is it being realized that the important factor in gas supply is not so much calorific value, but flame temperature as expressed roughly in the calorific value of the mixture of gas and its theoretical air requirements. Except in districts where calorific values have to be maintained at a high level, owing to distribution troubles, &c., there would be no advantage in utilizing special forms of enrichment. The primary duty of the gas industry is to produce gaseous therms at as low a cost as possible. So far no one has suggested that by the adoption of low-temperature carbonization as an auxiliary process to normal practice this cost per therm will be in any way reduced. Until that can be demonstrated, it is useless for gas engineers to incorporate such processes in their operations. When it can be demonstrated, it is certain that they will be readily adopted.

The use of solid smokeless fuel, in any case, is only the halfway house to the universal use of gas for domestic heating; and for the time being it should be possible for the gas industry so to improve its own solid smokeless fuel as to obviate any necessity for the domestic consumer to look anywhere else for his supplies. More and more central heating and semi-central heating is being adopted. More and more gas fires are becoming popular. To that extent the necessity for a solid smokeless fuel, produced in a new industry is being eliminated.

The gas industry is not against the development of low-temperature carbonization; but as business men they are not in the habit of adopting processes which are not proven, and the general public should take it as a definite indication that success has not yet been attained from the very fact that the gas industry has not yet adopted it.

Discussion.

The PRESIDENT (Mr. R. Robertson, of Bristol) said he hoped that those who were interested in the subject, and were in a position to do so, would deal with the various points raised by the author.

EXPERIENCES AT PLYMOUTH.

Mr. PERCY S. HOYTE (Plymouth) remarked that one of his reasons for rising thus early in the discussion was that he believed Plymouth was the first place in which the low-temperature carbonization process was installed on any scale. His Company had no financial interest whatever in the process. They were asked by a certain firm to lease

General Characteristics of some Low-Temperature Processes

—	Parker.	Fuel Research Board.	Plassmann.	Raffloer.	Thyssen.	Nielsen.	Marshall-Easton.	McLaurin.	Caracristi.	McEwan-Runge.
Retort	Vertical.	Vertical.	Horizontal superimposed trays.	Horizontal rotary.	Horizontal rotary.	Horizontal rotary.	Vertical with propelling screws.	Producer.	Horizontal conveyor.	Vertical shaft.
Charge	Intermittent.	Continuous.	Continuous.	Continuous.	Continuous.	Continuous.	Continuous.	Intermittent.	Continuous.	Continuous.
Heating	External.	External.	External.	External.	External.	Internal by producer gas or water gas.	Internal and external by water gas and "blow" gas.	Internal.	Lead bath.	Internal.
Coals handled	Selected coals or blends.		All coals and shales.	All coking coals and blends.	Coals and shales, except very sticky coals.	Coals and shales, except very sticky coals.	Coking coals and blends.	Semi-caking Scotch coals.	Coals and shale.	All coals in powdered form.
Coke produced from coal—										
a—Amount*	14 cwt.		14 cwt.	14 cwt.	14 cwt.	*A*—12·8 cwt. *B*—7·8 cwt.	14 cwt.† to *nil*.			
b—Nature	Mainly lumps.		Mainly lumps.	Briquette form.	Large lumps with fines	Large lumps with fines	Rope form	Small coke and fines.	Small coke and fines.	Powdered form.
Utility of coke	Domestic.		Domestic.	Domestic.	*Lumps*, domestic. *Fines*, boiler firing or briquetting.	*Lumps*, domestic. *Fines*, boilers or briquetting.	Domestic.	Domestic.	Boiler firing.	Boiler firing.
Gas produced from coal—										
a—Amount per ton*	4000.		4000.	4000.	4000.	*A*—3,300. *B*—22,000.	4,000 to 35,500†.	25,000.	4000.	4000.
b—C.V.* B.Th.U. per c.ft.	800.		800.	800.	800.	*A*—675. *B*—425.	800 to 376†	240.	800.	800.
Utility of gas	Enrichment	Enrichment	Enrichment	Enrichment	Enrichment	*A*—Enrichment. *B*—Town's supply.	Town's supply.	Industrial heating.	Enrichment	Enrichment

* In order to avoid showing varying yields of products for different plants which may be due to the use of different coals, plants with substantially the same type of heating have been given the same yields.
† Depending on the proportion of water gas made.

them a site, and this they did; and on this site the people referred to erected their plant, his Company undertaking to take from them what they called their residual—gas—at a certain fixed price in relation to his Company's own costs of production. If an unlimited supply of capital and enthusiasm could have made that process a success, it would have been running to-day, not only at Plymouth, but doubtless also in connection with many other undertakings. He would like, however, to say—and he thought he was reflecting the opinion of all those who had had direct or indirect experience of low-temperature carbonization—how much they appreciated the admirable way in which Dr. Smith, in his paper, had summed up the relations which now existed, and had existed, and it seemed to him (Mr. Hoyte) must continue to exist, between the various low-temperature carbonization processes and the gas industry. They had had ample opportunity at Plymouth of observing the effect of various coals on the composition of the fuel, both in their own grates on the works and in those of their friends who tried to use the fuel. They would recollect that the great idea of the originator of the low-temperature process, Mr. Thomas Parker, was that the pit-head slacks should be used all over the country; but, as Dr. Smith had pointed out, it was entirely a question of ash content. He himself had seen the ash in a low-temperature solid fuel fire actually put out that fire within half-an hour of its burning brightly. The result was that these people had to use, in order to obtain a satisfactory smokeless fuel, the highest grade of Yorkshire nuts. This practically killed the process from the financial point of view. Another thing was that in their district people could not afford to pay a fancy price for smokeless fuel. The owners of the plant had very exaggerated ideas of the value of their fuel, and the price constantly went up, until the market disappeared, and the plant with it. The table at the end of the paper was highly interesting; but he noticed there were several blanks under the heading of the particular plant upon which the author dwelt most—namely, the Fuel Research Board plant. He did not say what coals were being handled or what fuels were being produced. His (the speaker's brother had had some of this particular solid fuel, and spoke very highly of it. Neither did the author say anything about the calorific power of the gas. At Plymouth the low-temperature gas produced was in the neighbourhood of 750 to 800 B.Th.U. It was an extraordinarily rich gas; and they found it—this was about eighteen years ago—very difficult to purify. There must have been some very low-temperature paraffins in the gas; and although they never sent out at one time more than 15 p.ct. of low-temperature gas, they had complaints from all over the district as to the peculiar sickly odour connected with the gas. So long as the low-temperature process persisted at Plymouth, the complaints persisted; but when the process closed down, the complaints ceased. Of course, the production of oils was another aspect of the matter. They were all aware that there were processes which could, in the laboratory, practically convert the whole of the solid coal into liquid oil; and he hoped, from the national standpoint, that this might prove technically and commercially successful. In the meantime Dr. Smith seemed to sum up not only the past but the present aspect of low-temperature carbonization in relation to the gas industry.

GASEOUS *v.* SOLID FUEL.

Lieut.-Col. H. W. WOODALL remarked that the paper dealt with a subject which one looked at with the greatest interest. Personally, he could not help thinking that any process which tended to increase the amount of solid fuel which they produced was, under the present conditions of the gas industry, a mistake. The gas industry could meet the wants of the public by supplying the handiest, cleanest, and most useful form of heat, in the shape of gas. Any solid fuel must produce dust, which entailed unnecessary labour. Further, as Dr. Smith himself had pointed out in his paper, the gas industry already produced a solid fuel which would perform any of the functions which the low-temperature fuel would perform. It seemed to him (the speaker) that low-temperature fuel could be put very much on a level with electricity, as a thing with which to conjure up interest on the part of people who knew very little about it. Neither low-temperature carbonization nor electricity would produce any different state of affairs from that which they knew to-day. Were it not for the existence of water gas plants, he did not know what the present position of the gas industry would be. They would not be able to sell anything like the amount of solid fuel they made. If anything ever was to come from low-temperature carbonization, it appeared to him that it could only come from some process which was radically different from anything that had been submitted up to the present—with the exception possibly of the McEwen-Runge process, which produced a fuel that had a limited application, but was useful. He did not think low-temperature carbonization would come about so long as it was necessary to apply their existing knowledge of carbonizing methods.

THE RIGHT IDEAL FOR THE GAS INDUSTRY.

Sir ARTHUR DUCKHAM, K.C.B., remarked that there were present at the meeting quite a number of persons who had had considerable experience with low-temperature carbonization. He found himself in agreement with Colonel Woodall, that they ought to banish as far as possible solid fuel from the domestic grate. This was the right ideal for the gas industry. It was what he had done in his own house. Even in small houses, the principle of central heating was being adopted; and those who had lived in a centrally-heated house would never afterwards live in one that was not so heated. Gas undertakings could supply a perfectly satisfactory solid fuel for this purpose. The ash content of solid fuel was a most important point for them to bear in mind. The trouble to-day was that many solid fuels had so large a percentage of ash that they were difficult to keep alight. Far more attention would have to be paid to the question of cleaning fuels for distribution. It must be entirely uneconomical to distribute fuel with ash in it. He had used the fuel from the East Greenwich Research Station in large quantities, and it was very satisfactory; but he did not think he would be prepared to pay a higher price per ton for it than for the coke from the local gas-works. Yet, so far as the finance of low-temperature carbonization was concerned, he had never up to now seen a satisfactory balance-sheet that had not depended upon a higher price for the resultant fuel than could be obtained for coal or coke in the same area. Another thing was that it was not an easy process, and capital costs were of necessity somewhat high. He had had some experience with mechanical processes for carbonizing coal, and was aware that one got a certain amount of trouble with some classes of coal. Low-temperature carbonization was much more open to these troubles. What one was anxious for were methods of using up all the coals, and not only specialized varieties; and low-temperature carbonization had had to go to specialized coals rather more than any other process. The question was one of tremendous interest still, and it was quite extraordinary to see how prominent men were attracted by these wonderful words "low-temperature carbonization," chiefly from the national point of view of oil production. There was a body of people in this country called the National Fuel and Power Board, which held its first meeting on the previous day. He did not know what was coming out of it, but this was one of the points a lot of members talked about. But the members who knew less about fuel than the other ones spoke most strongly on questions of low-temperature carbonization. Dr. Smith had admirably focussed the position, though in saying this he did not necessarily mean that he agreed with everything that was in the paper.

FROM THE FUEL RESEARCH STATION.

Dr. G. J. KING (Fuel Research Station, East Greenwich), called upon by the President, said that Dr. Smith had put before the meeting a very clear presentation of the subject of low-temperature carbonization. The most important desideratum in a low-temperature plant was that it should be technically sound. After this had been proved it would be necessary to determine whether it would continue to work satisfactorily as a commercial unit. Dr. Smith had been kind enough to speak highly of the plant at the Fuel Research Station, but had given few details, as Mr. Hoyte had pointed out. He (Dr. King) had with him a drawing of the plant at the Fuel Research Station, and some of the data obtained, which anyone interested could see at the end of the meeting, and have an explanation of. One point that had been raised in the discussion was that gas might become the universal fuel. In the meantime, one of the objects of low-temperature carbonization was to provide a smokeless fuel to take the place of the 40 million tons of coal consumed annually. It would appear that there was a gap which must be bridged over, and it seemed that it might be bridged over by the low-temperature process. Would it show a profit? He agreed that no plant had yet shown that a profit could be made on this process. The basis they went upon at the Fuel Research Station was that a larger credit for their smokeless fuel than the price of household coal should not be taken, and in this case the profit margin was very low indeed. What profit could be brought in by the sale of oil was doubtful. At present they could only take it into account at the market value of crude oil. Many types of coal had been used; and the old story as to the value of non-caking slacks was no longer accepted. Some process which implied a caking coal was necessary. At the Research Station they produced a lump smokeless fuel which contained not more than about 15 p.ct of breeze passing a ½-in. screen. If they had to deal with run-of-mine coal, it would have to be briquetted before carbonization.

The PRESIDENT said they had with them a lady who had placed the gas industry, and all those who were interested in fuel problems, under a deep debt of gratitude for the work she had done. He was sure the members would wish him to extend a very hearty welcome to Dr. Margaret Fishenden, and to say that they would appreciate a few remarks from so great an authority upon fuel.

RANGE MANUFACTURERS MUST CO-OPERATE.

Dr. MARGARET FISHENDEN said that she had not had an opportunity of seeing the paper before the meeting, and had not come with any intention of speaking; but one or two minor points had occurred to her while listening to the author. Dr. Smith said that the use of solid smokeless fuel in any case was only a half-way house to the elimination of solid fuel for domestic heating by gas. One rather interesting fact in connection with this subject was that the domestic consumption of raw coal per head was bigger now than it was before they had all these gas appliances. Of course, the standard of living had gone up. Now, going on from this, she began to wonder what would happen if they should substitute gas for solid fuel altogether in their houses; and it appeared to her that there were two cases to consider. When the coal was carbonized, it produced coke and gas, and she thought there were good grounds for supposing that the coke produced, which would be about half as much as the coal, would, in (say) an independent boiler, do an amount of work about equivalent to the whole quantity of coal. Then the question arose as to whether, in order to use gas for the other services—for heating sitting rooms, &c., and for cooking—they would need all the gas produced from the coal. If all the gas were needed, the first result would be that the householder's bill would be very much increased, and, secondly, there would not be any surplus gas. The second case to consider was that it would take less than the total amount of gas produced to do all necessary in the home in conjunction with the coke. In that event, the householder's bill might or might not be more, and there would be a surplus of gas. It did not seem possible to say where the real line would come, until they had carefuly prepared details of the gas and coke required for running houses of different kinds. Going back to the earlier part of the paper, Dr. Smith had said that the two qualities required in a smokeless fuel were that it should be smokeless and that it should be clean. She would like to add a third condition—that it should do its job. One of the main objects of making a solid fuel was that by its aid they should be able to eliminate smoke from their houses as now equipped. In dealing with houses still to be built, the problem was relatively simple, but it was only by the use of a free-burning solid fuel that they could get rid of smoke from houses already fitted up. She was not sure that the problem would be solved if they had this fuel. There were heaps of kitcheners in which coke, though it burned well, did not heat the water. The matter was one in which,

it seemed to her, they would have to get the co-operation of the range manufacturers. There was a further point in favour of bringing range manufacturers "up to the scratch," in that, if coke did prove unsatisfactory in the kitchen range, it was an indication of the extravagance with which coal had been used in that range.

THE "HALF-WAY HOUSE."

Dr. HAROLD G. COLMAN said there was not enough in the paper with which he thoroughly disagreed for him to wish to attack it, though in every detail he was not in agreement with what the author had stated. Some of the points he might have touched upon had already been dealt with by different speakers; but he might perhaps emphasize one or two things. The discussion was, of course, not on low-temperature carbonization as a whole, but only as far as it concerned the gas industry. With regard to the statement that the use of solid smokeless fuel was only the half-way house to the time when they would use all gas, he was afraid he could not go quite so far as that. A great deal of the 40 million tons of coal that had been referred to was consumed in places where there were at present no gas undertakings. It might be that in the long run gas would become available in these places—when they got their grid of mains all over the country in competition with their electrical brethren; but this was far ahead, and he felt strongly that there would be a use for a good smokeless fuel for many years to come. At any rate, he should say that for the next twenty years there would be a demand for such a fuel, if it could be provided at a sufficiently cheap rate. When he said "a sufficiently cheap rate," he got to the whole root of the matter. The great difficulty was to find any process which at present could show that it was soundly economical. He was not saying that some of the processes might not turn out to be so, but up to the present, although he had set to work with the greatest desire to find that they were economical, he had never been able to do so, when he put a value on the products which he felt could be mantained, not for a moment only, but over a period when large quantities were being manufactured.

THE POSITION OF THE GAS INDUSTRY.

The PRESIDENT said he was glad Dr. Smith had laid emphasis on the fact that the gas industry was not opposed to low-temperature carbonization as such, though they were frequently credited with being so. What they were opposed to was the financial and political shifts which the promoters of these schemes indulged in in order to popularize low-temperature carbonization. He thought it could fairly be said that the worst enemies of low-temperature carbonization were its financial and political friends. The extravagant claims made for it had emphasized its failure to take its place as a commercial method of carbonizing coal. They had heard that low-temperature carbonization had now been made a practical proposition. Engineering difficulties had been overcome; and although it was not so far a paying proposition, there appeared to be no reason why it should not become so in the future—especially if legislation against smoke should lead to a ban being placed upon the combustion of raw coal. Such legislation, he thought, had been brought perceptibly nearer as a result of the present coal dispute. They had had some experience of what it meant for the householder and for public services to be dependent on foreign coal; and if there was one lesson which they had been taught, it was the importance of the conservation of this country's fuel supplies. Judged by the test of coal conservation, he was afraid the low-temperature process did not show up very well. Dr. Colman had rightly said that they could not for some time substitute gas for coal in out-of-the-way country districts; but another point which could be made was that any attempt to substitute for coal, even in these districts, low-temperature carbonization fuel, instead of contributing to coal conservation, would really lead to increased consumption. He was under the impression that Sir Richard Redmayne recently calculated that, if all the coal consumed in domestic fires could be displaced by low-temperature carbonization fuel, it would lead to an increased consumption of coal of 15 million tons per annum. So that on this account the claims of the low-temperature carbonization advocates fell very flat. There was a point on which he should like to have some further information.

LOW-GRADE FUELS.

One of the claims for the process was that it could be used to deal with low-grade fuel. He was not sure what this included. He suspected that the gas industry knew more about low-grade fuels than it was credited with knowing. [Laughter.] If it referred to Somerset coal, the answer was that the gas industry already carbonized it. They had, in fact, an instance here of a particularly low-grade fuel being made to produce, much to the amazement of some of them, the cheapest gas in the country. They also had an example at the Institution meeting last year, in Mr. Carr's contribution, in which he gave extraordinarily good results obtained entirely from slacks. Therefore what he could not understand was what fuel could be utilized by the low-temperature that could not be utilized by the high-temperature process. Briquetting was not precluded from the ordinary high-temperature processes, and he would be glad to hear what was being done in this connection. Another claim had already been referred to—namely, that the low-temperature carbonization process would materially assist in solving the problem of the future supplies of oil from the country. He would like to ask Dr. Smith whether he did not think the proper direction in which to look for a solution was some of the direct recovery processes, of which they had heard so much.

THE AUTHOR'S REPLY.

Dr. SMITH, in reply, said that, in remarking that he was of the opinion that solid smokeless fuel was only a half-way house, and that "all gas" was the ultimate goal to be aimed at, he had in mind entirely the domestic fire—not necessarily the kitchen range—believing that the ideal was central heating or semi-central heating, and a gas-fire in sitting-rooms, &c. He had tried it. As was the case with Sir Arthur Duckham, he had no coal in his own house, but gas fires and central heating "filled the bill," and at no higher cost than would be involved by the use of coal as consumed in the ordinary way. With regard to the percentage of kitchen ranges which were extravagant and inefficient with coke and coal, Dr. Fishenden had appealed to the manufacturers to improve this; and he did not think the low-temperature people or the gas industry would have to take it into account. Mr. Hoyte had alluded to the oils that came from low-temperature carbonization giving trouble in the gas. There was no doubt they did give trouble—particularly if the gas was not washed. It was certain to be found that in all circumstances it would pay handsomely to wash the gas for these light oils.

THE "SALERMO" SYSTEM.

In the list of processes he had drawn up, he had not included a new system which had been working under particular conditions in France for some time. It was known as the "Salermo" process. From the particulars he had had of it, it would appear that it was of value to the gas industry only in isolated cases. Experimental work in connection with briquetting was proceeding slowly, but there were difficulties in connection with the use of pitch as a binder. With regard to the question of the production of oils in much larger quantities, he understood that Dr. Bergius was of the opinion that so far the Bergius process for treating coal showed no prospect of being an immediate commercial success. This, he thought, was definite.

SPECIFICATIONS FOR PIPE FLANGES.

Published by the "B.E.S.A."

The British Engineering Standards Association have published Specification No. 253, 1926—"British Standard Table of Cast-Iron Flanges for Pipes, Valves, and Fittings for Gas" (copies of which can be obtained from the Association Publications Department, 28, Victoria Street, S.W. 1; price 1s. 2d., post free). The dimensions are based on proposals submitted by a Joint Committee of the Institution of Gas Engineers and the Society of British Gas Industries, and have been approved by this Joint Committee.

In a foreword to the specification, it is mentioned that the dimensions, which are for working gas pressures up to 30 lbs. per sq.in., comprise part of Table A of the revised British Standard Tables of Flanges (superseding publication No. 10, 1904) now in course of preparation. They have been issued in advance of the publication of the complete tables at the request of the Institution of Gas Engineers.

As examples of the figures given, it may be stated that for a nominal pipe size of 10 in. the diameter of the flange is 16 in., the diameter of the bolt circle 14 in., the number of bolts 8, their diameter $\frac{3}{4}$ in., and the thickness of the cast-iron flange $\frac{11}{16}$ in. For a 40-in. pipe, the diameter of the flange is $47\frac{1}{2}$ in., the diameter of the bolt circle 45 in., the number of bolts 24, their diameter 1 in., and the thickness of the cast-iron flange $1\frac{3}{8}$ in.

SPECIFICATION FOR STEAM PIPE FLANGES.

The Association have also published Specification No. 10, Part 2, 1926—"British Standard Tables of Pipe Flanges." These are for working steam pressures up to 450 lbs. per sq.in. (The publication can be obtained from the address given previously; the price being 1s. 2d., post free.)

This publication is a revision of the flanges for steam originally issued in 1904. Owing to the increasing use of higher pressures, the preparation of the present tables was found necessary. A table for still higher pressures is in contemplation. The original tables have been reviewed in the light of the experience gained since they were first published, and many modifications have been made.

With the exception of the $\frac{1}{2}$ in. and $\frac{3}{4}$ in. nominal sizes of the 250 lbs. and 350 lbs. standards, no changes have been necessary in the flange or bolt circle diameters. The limiting working pressure of the original 55 lbs. standard has been altered to 50 lbs.; while those of the 125, 225, and 325 lbs. standards have been increased to 150, 250, and 350 lbs. respectively, as being more in accordance with present-day requirements. To provide an intermediate step in working pressure between the 50 lbs. and 150 lbs. standards, a table for a pressure of 100 lbs. has been added. The table of dimensions for short bends and tees of cast metal (Table 4 of the 1904 edition) has been included as an appendix, but the table of long bends of wrought iron and steel (Table 5 of the 1904 edition) has been omitted.

Gas Oil.—We recently recorded the heavy increase there has been in the imports of gas oil during the coal stoppage [*ante*, p. 275]. Unfortunately, however, the price has been raised. From the 2nd inst., it was advanced by $\frac{1}{2}$d. per gallon, to 6$\frac{1}{2}$d., net and naked, *ex* wharf.

GASEOUS FUELS.

Considered by the Glasgow Sections of the Institute of Chemistry and the Society of Chemical Industry.

At a well-attended meeting held on Tuesday, Nov. 9, Prof. T. GRAY, of the Royal Technical College, Glasgow, described "An Apparatus for the Supply of Gas at Constant Pressure." This is a device designed by him for automatic regulation of the pressure of gas used for test purposes in laboratory or gas-works. Without a sketch the device is not intelligible. We understand this will appear in "Chemistry and Industry" shortly.

Dr. W. B. DAVIDSON, Consulting Chemist, Newcastle-on-Tyne, gave an address on "Gaseous Fuels." A synopsis of his lecture, which was more popular than technical in its main features, is as follows:

1. *Discovery and development of lighting gas.*

2. *Present consumption of town gas.*—Attention was drawn to the fact that town gas supplies eight or nine times as much, in terms of heat, as electricity does in this country.

3. *The Gas Regulation Act* was explained, together with the steps leading up to it. The therm and the new use of the term "thermal efficiency" were entered into at some length, and emphasis was laid on the importance of using proper appliances giving the highest degree of efficiency.

4. *Gas in competition with other fuels.*—The relative efficiencies and costs of gas, coal, coke, and oil for heating and power production were set out. With regard to electricity, it was demonstrated that, as a heating agent, it could not appeal to thrifty Scotsmen, as it was seven times as dear as gas, therm for therm. In the matter of illumination, while it could be said that electricity at 2d. per unit was equal to incandescent lighting with low-pressure gas at 7d. a therm, there was a compensating element in using the latter, in that in most cases during the greater part of the year an incandescent burner fulfilled a necessary function in supplying heat to dwelling rooms. The gas fire could be turned out or lowered when the gas lights were turned on.

5. *The essentials of a satisfactory town gas.*—The composition of town gas, with special reference to the content of inerts and carbon monoxide, was then considered. It was shown how greatly the views of chemists and gas engineers have changed during the last ten years, especially with regard to the calorific standard; the latitude in quality and composition being as wide as anyone could wish, and the chief desideratum being now a reduction in price.

6. *The inter-relation of quality, efficiency, and cost per therm. Low-grade gas.*—In discussing this subject, the lecturer attached most importance to the manufacture of high-grade producer gas, and pointed out that Mond gas usually made from coal under ammonia recovery conditions was unsuitable for admixture with coal gas, owing to its high content of carbon dioxide and its comparatively low quality. If proper attention were paid to the manufacture of producer gas, much more of this cheap gas could find a use in town supply. It was well known that producer gas was excellent for engines and for low-temperature furnace work; but few people had yet recognized that high-grade producer gas was also suitable for gas fires and even incandescent lighting, when burnt in proper appliances. A new idea was put forward of rendering producer gas directly usable for town purposes, assuming that the difficulties of distribution could be overcome, by making use of the Mazza process of enriching the air blast. Prof. Mazza, formerly of Turin University, is said to be able to increase the oxygen content of the air by a patent centrifugal machine at a very low cost. The oxygen content attained is 27 p.ct. (30 p.ct. can be reached) as against 20·9 in ordinary air. The lecturer estimated that by enriching the air in this way the quality of producer gas might easily be brought up to 200 B.Th.U. or over.

In the discussion that followed the lecture, Mr. LANGLANDS, who presided, referred to the competition between gas and electricity for street lighting, and indicated that the latter was gaining ground, owing to its greater convenience and lower maintenance costs.

Mr. MCLEOD said that, as a gas engineer and a chemist, he could not understand the reluctance of the gas industry to strip the gas and produce benzole, which was so much in demand. He drew attention to the ill-effect that the use of German Westphalian coal had on the naphthalene content of the gas.

Prof. GRAY explained the reasons that had weighed with the Carbon Monoxide Committee in refraining from recommending any restriction of the content of that constituent in town gas.

Mr. MACLAURIN was of opinion that the gas industry should give up striving to retain the lighting load against electricity.

Baillie W. B. SMITH spoke of the success of the Maclaurin process at the Dalmarnock Gas-Works.

Prof. PATERSON raised the question of the possibility of introducing odoriferous material to give a characteristic and distinctive smell to water gas, thus rendering it safer for general use. He also asked what the respective leakages were in the supply of gas and electricity.

Dr. DAVIDSON replied that there was no difficulty at all in imparting the necessary odour to water gas, and that the respective real leakages of gas and electricity were about 3 p.ct. and 12 p.ct. for long-distance transmission.

DARTFORD GAS-WORKS CENTENARY.

Some Interesting Events Recalled.

AUGUST last saw the completion of a hundred years since the formation of the Dartford Gas Light Company; and the event was marked by the "West Kent Advertiser" by the publication of an interesting history of the undertaking, from which we take some particulars and illustrations.

Dartford, though in those days but a comparatively small Kentish town, was only fourteen years behind the first gas company to receive the Charter—the Gas Light and Coke Company—and only two years behind the South Metropolitan Company, who were established in 1824. It will thus be seen that the Dartford undertaking, in its early establishment, was among the pioneers of public gas supply in the United Kingdom. A plan for lighting the town of Dartford with gas was under consideration for more than twelve months before the formation of the Company. It was not, however, until June, 1827, that public gas lighting was commenced.

In August, 1829, the first dividend was declared—5 p.ct., with liberal provision for contingencies. Matters continued satisfactorily until in 1843 a dividend of 7 p.ct. was declared. After many years' payment of 7 p.ct., a 10 p.ct. dividend on the original capital was declared in 1869, and 7 p.ct. on the new capital.

SOME STATISTICS

The following figures convey an idea of the rate of progress made:

Gas sold during the year 1827-28, approximately, 500,000 c.ft. In 1925, 309,000,000 c.ft.

Number of consumers in Dartford district in 1918, 5731; number in 1926, 8311.

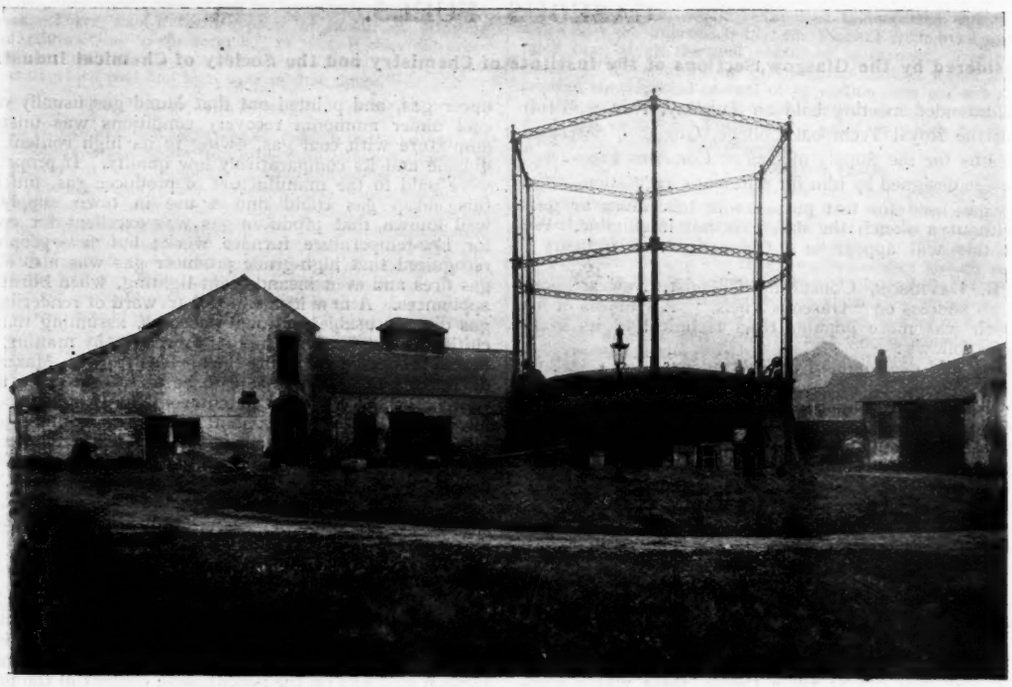
The progress has been continuous, and what has been done since the amalgamation of the Dartford Gas Company with the South Suburban Gas Company is apparent from the subjoined comparative figures:

Number of cookers on hire in 1902, 682; in 1918, 2571; and in 1926, 5846.

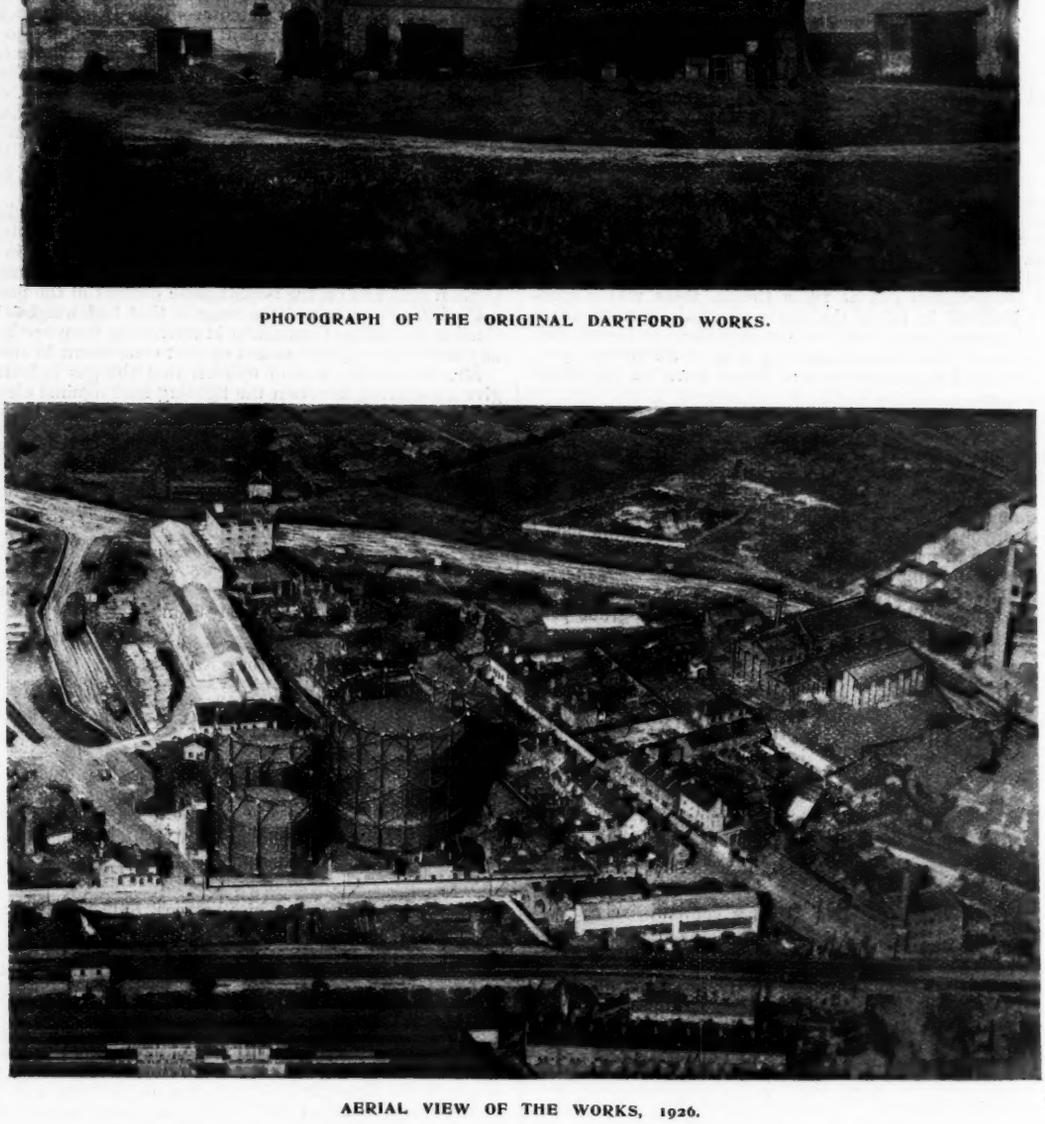
The number of fires and other appliances on hire also this year, 1298. The Dartford Gas Company did not let fires or other appliances out on hire; they were only sold outright or on the hire-purchase system.

Price of gas: 1827-1839, 11s. per 1000 c.ft., and £3 10s. per wing burner per annum. In 1852, meters had to be used for more than one wing burner. From 1880 until 1894 the price of gas in the Darenth Vale area was 1s. per 1000 c.ft. in excess of the Dartford area; but in 1894 one price was charged over the whole of the district. In 1918 the price of gas was 5d. per 1000 c.ft. in excess of that charged by the South Suburban Gas Company; but from 1924 it was reduced to the price in the Sydenham area.

In December, 1866, the Clerk (Mr. Hayward) reported that, to avoid delay, he had considered it his duty to take upon himself the responsibility for giving parliamentary notice of an application for an Act for the incorporation of the Dartford Gas Company, and to have the draft prepared. He had done so because notice had been given by the promoters of the West Kent Gas Company of their intention, in the ensuing session of Parliament, to apply for powers to extend their works to supply Dartford. Mr. Hayward's prompt action was approved by the Directors, and the requisite further steps were ordered to be taken to secure the Act and oppose the rival Company. A month later the latter approached the Dartford Company with a proposal for amalgamation. As a result of conferences between representatives of the two Companies,



PHOTOGRAPH OF THE ORIGINAL DARTFORD WORKS.



AERIAL VIEW OF THE WORKS, 1926.

they came to an agreement—the West Kent Company to withdraw from their Bill in Parliament the clauses relating to Dartford, and the Dartford Company in a similar way deleting from their Bill the parishes of Bexley and Crayford. Thus amended, the Dartford Company's Bill was duly passed; the Royal Assent being given on June 17, 1867. In that year the works were valued at £8000.

A HOLDER COLLAPSE.

The following is the story told of the collapse of a holder, shortly after 11 o'clock on the night of July 1, 1870:

Describing the collapse as a "terrible explosion," one writer has left it on record in the form of an illustrated leaflet that a scene was created which had had no parallel in Dartford since the Flood. In calmer moments, he might have added, "as far as history reveals." The facts, according to his authority, were that the "huge gasometer," which was lying a wreck while he was writing his account, had been constructed at a cost of over £5000; the contractors being Messrs. Horton & Co., of Birmingham, and its capacity, with a diameter of 74 ft., being 100,000 c.ft. of gas. Only a fortnight had elapsed after completion (the labours having lasted some months), when sounds as of a quick succession of pumps, and then as of the rushing of a great volume of water, awakened, among the townspeople, the occupant of a humble tenement in Gas Lane. Rushing to his window, he was the first witness of "a torrent of water, stones, bricks, and mud rushing down the lane, while a broad, red glare lit the sky with a blinding blaze." The shock was paralyzing to many in its effects; but a number of frightened spectators from Waterside and the railway station rushed in the direction of the gas-works, apprised, by the general extinction of the gas-lights, of the nature of the catastrophe. Though it was a moonlight night, "the vanished glare left an impression of Cimmerian darkness."

Daylight revealed a strange scene, which is thus described

by the same writer: "The huge iron columns erstwhile supporting the gasometer were either shattered to pieces or torn from their foundations. The water-casing was entirely blown away, and fragments of it, tons in weight, had been swept away, as the after-current of an express train scatters scraps of paper in a roadside station. The surrounding wall was not merely rent in twain, but cleanly and perfectly levelled. The bricks of which it was composed lay at all distances from 30 to 100 yards; and on the south side (in Priory Lane), the old wall of Dartford Priory, restored in the reign of Queen Elizabeth, exhibited a ghastly rent 20 yards in length. On the western side there was clearly traceable the point where the receiver had yielded to the strain. The cavity would have admitted a waggon; and further on, was a smaller one." That there was not "a fearful destruction of life and property," was accounted for by the fact that the force of the explosion was expended in one particular direction, where it happened that the resistance was least. The inmates of the engineer's house were rescued through windows; the lower rooms being flooded.

The collapse of the holder was most probably due to the cast-iron tank giving way under the pressure of water. It contained approximately 140,915 gallons, or 629 tons. The steel tank of the larger of the three holders now standing contains no less than 1,760,598 gallons, or 7859 tons.

PERSONAL.

Mr. Frank Morris, of Brentford, was engaged in 1873 to make a thorough inspection of the works, and subsequently was appointed Consulting Engineer to the Company—becoming later Managing Director. In 1874 Mr. W. P. Mills became Manager. Mr. J. H. Carvosso was appointed Manager in 1882. On the death of that gentleman, Mr. F. W. Rapkin succeeded to the position; and he acted in this capacity until his death, a few weeks before the amalgamation with the South Suburban Gas Company on Jan. 1, 1919. The Dartford Directors at the time of the amalgamation were: Mr. Chas. Beadle (Chairman), Mr. A. M. Fleet (Deputy Chairman), Sir George Whitehead, Mr. H. E. Baily, and Mr. B. R. Green.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Southall Works of the Gas Light and Coke Company.

On Saturday, November 13, members of the Association, accompanied by their President, Mr. Arthur Broadbent, visited the Southall Works of the Gas Light and Coke Company. The weather was far from favourable, but the enthusiasm for which the Association is renowned was not dimmed by this fact, and there was a good attendance. Mr. J. S. Thorman, the Engineer, was there to meet the visitors; and the inspection of the works was made under his guidance and that of his assistants.

The total area of the works is 76 acres, of which the plant occupies forty, the remainder being used for a sports ground and allotments. Coal is received by rail and canal. Locomotives deal with the rail wagons, and Grafton cranes unload the barges; a caterpillar crane being used for handling coal to and from the storage heaps.

CARBONIZING PLANT.

There are four retort houses. No. 1 House consists of 36 beds of six inclined (36°) retorts, 24½ in. by 14 in. by 15 ft., arranged in two benches of eighteen, with a common charging stage. Coaling is carried out by two inclined bucket elevators to two push-plate conveyors discharging into overhead hoppers. The coke is removed by two De Brouwer hot coke conveyors to two bucket elevators discharging to storage heaps or direct to railway trucks.

No. 2 House comprises a bench of twelve horizontal settings of ten retorts, 24 in. by 18 in. by 22 ft., constructed by Messrs. Gibbons Bros., in segmental silica work. Charging and discharging are carried out by a Drakes' machine, and the coke is removed by a De Brouwer conveyor, and elevated to storage hoppers parallel to the house. Two inclined bucket elevators deliver coal to two push-plate conveyors which discharge into elevated hoppers over the charging machine. Each setting is provided with two hydraulic mains; the ascension pipes being isolated during the charging by plug valves operated from the stage. The bench is divided into four sections of three settings, each being controlled by a Parkinson governor.

At the south end of No. 2 House is a Woodall-Duckham vertical retort installation of sixteen retorts (4½ to 5 tons) in four settings of four retorts. Coaling is carried out by a bucket elevator delivering on to a push-plate conveyor discharging into the hoppers, which alternate with coke hoppers supplying the producers. The latter are fed from the discharging floor by a bogie run and lift.

No. 4 House contains eighteen settings of six inclined (31°) retorts, 24½ in. by 14 in. by 20 ft., worked in two sections of nine settings each. The coaling plant is similar to that of No. 1 House, but is not in duplicate. Coke is removed by a De Brouwer conveyor feeding into a Babcock & Wilcox tray elevator and conveyor, which delivers either to the blue water gas plant or to wagons. The collecting mains are of the dry type; plug valves operated from the stage serving to isolate retorts while being discharged.

No. 5 House comprises 25 settings of eight inclined (32°) retorts, 24½ in. by 14 in. by 20 ft., operated in two sections of eight settings and one of nine settings, each controlled by a Parkinson governor. Nineteen of these settings are of segmental silica construction. The gas collecting system is similar to that of No. 4 House. Coaling is effected by an inclined bucket elevator delivering into a Babcock & Wilcox tray conveyor over the hoppers.

A comparatively new departure is the centralized control of No. 5 House; this control being in a building adjacent to the discharging stage. This unit comprises a Fairweather recording calorimeter and three "Arkon" vacuum recorders, by the side of which are the valves controlling the water loading of the governors. At a future date a volume recorder is to be added.

CONDENSING PLANT, &C.

Atmospheric condensing mains are followed by a battery of three Morris & Cutler water condensers (capacity 4¾ million c.ft. per day) and two batteries of the water-tube type (capacity 8½ million c.ft. per day); the water in all cases being delivered by Weir pumps, drawing from the canal.

The exhausting machinery is concentrated in one house, and consists of the following:

- A British Thomson-Houston turbo-exhauster (nominal capacity 300,000 c.ft. per hour), but capable of an overload of 125,000 c.ft.). It is fitted with a Weir jet condensing plant.
- A Donkin exhauster with a capacity of 277,000 c.ft. per hour, driven by a horizontal condensing Donkin engine.
- A Gwynne exhauster (capacity 307,000 c.ft.) with Donkin engine.
- A smaller Gwynne exhauster, driven by a vertical marine condensing engine.

Scrubbing is effected by a battery of four tower scrubbers, filled with brushwood; the latter being placed in a vertical position in lieu of the usual horizontal method, the liquor or water being supplied through rotating sprays.

In addition to the above, there is an installation of three Kirkham, Hulett, & Chandler centrifugal washer-scrubbers, having a total capacity of 6 million c.ft. per day; the power being supplied by two Tangye engines.

Adjacent to this plant is the pump house, in which are situated the pumps handling tar, liquor, and condensing water, and also the hydraulic pressure supply to the oil gas plant.

The coal gas purifying system consists of the following:

Two sets of three boxes, 50 ft. by 50 ft. by 7 ft.
Two sets of three boxes, 40 ft. by 40 ft. by 6 ft.
Two sets of four boxes, 30 ft. by 30 ft. by 6 ft.

The coal gas metering is carried out by four station meters of the usual drum type, their capacity being:

(1) 125,000 c ft. per hour
(2) 80,000 „ „
(3) 125,000 „ „
(4) 200,000 „ „

The benzole and naphthalene washing plant comprises a Whessoe rotary washer of 7 million c.ft. per day capacity, at present in use for naphthalene washing only, until the completion of the crude benzole plant.

CARBURETTED WATER GAS PLANT.

The water gas plant is in two sections; the main section containing four 1-million c.ft. per diem carburetted water gas sets and one 2-million c.ft. per diem set, the latter being operated by hydraulic power. Coke is delivered by "Sentinel" tipping wagons to an inclined bucket elevator discharging into elevated concrete hoppers; the latter being provided with chutes to each generator. The air blast is supplied by a No. 10 Sturtevant open-type fan, direct coupled to a 75 H.P. De Laval turbine fitted with special nozzles to develop 85 H.P. This unit is in duplicate, and in addition there is a 75 H.P. Sturtevant turbine coupled to a No. 10 Sturtevant high-pressure fan. Oil is delivered by a Weir (horizontal) pump in duplicate.

After condensation by a battery of six water-tube condensers, the gas passes into a 75,000 c.ft. relief holder, and is withdrawn

by one of the following exhausters: 265,000 c.ft. per hour Donkin, 200,000 c.ft. per hour Donkin, and 150,000 c.ft. per hour three-blade Waller.

The oil gas purifiers consist of two sets of four dry-luted boxes, 44 ft. by 37 ft. and 45 ft. by 40 ft. respectively.

The gas from this plant is measured by a "Thomas" electrical meter of a maximum capacity of 400,000 c.ft. per hour, to which is attached a continuous chart recorder.

BLUE WATER GAS PLANT.

This is situated at the south end of No. 4 House; the latter supplying coke direct into elevated hoppers over the generators. The plant comprises two 1½-million c.ft. per diem blue water gas sets with waste-heat boilers. The air blast is supplied by a No. 9 Sturtevant fan coupled to a 55 H.P. De Laval turbine, with a duplicate set as a reserve. A 3000 lbs. per hour Cochran boiler supplies steam for starting-up. The gas from this plant is delivered direct into the foul mains of the retort houses, the C.W.G. holder acting as a relief. Purification is carried out with the coal gas.

HOLDERS.

The total storage capacity is approximately 7¼ million c.ft.:

No. 1 Holder, single lift, capacity 424,000 c.ft.
No. 2 Holder, two lift, capacity 1,130,000 c.ft.
No. 3 Holder, two lift, capacity 2,111,000 c.ft.
No. 4 Holder, two lift, capacity 3,595,000 c.ft.

POWER.

Steam power for the works (excluding the B.W.G. plant) is supplied by a battery of five 30 ft. by 8 ft. and three 24 ft. by 7 ft. hand-fired Lancashire boilers, in conjunction with which four Babcock & Wilcox water-tube boilers are at work on the waste-gas outlets of Nos. 2 and 5 retort houses. The boilers on No. 2 House have a heating surface of 2760 sq.ft. each, and on No. 5 House 2652 sq.ft. each. When the demand necessitates, an auxiliary Lancashire boiler, 30 ft. by 7 ft., can be brought into service. This is situated near the boosting plant.

Water for boiler feed is a mixture of canal and artesian well water raised from a well situated by the sulphate of ammonia works, and is treated in a Kennicott softening plant (lime-soda process) having a maximum capacity of 10,000 gallons per hour.

Electric power, a large proportion of which is consumed in No. 2 House, is generated by one of the following generating sets: 65 KW. Crompton Reader, 90 KW. Crompton Reader, and 150 KW. Crompton Belliss Morcom. These generators are situated in a building on the west side of No. 2 House (with ample room for extension).

Distribution is effected by the following turbo-boosters:

1 Brotherhood-Rateau, 1,000,000 c.ft. per hour capacity.
1 De Laval-Rateau 400,000 c.ft. per hour capacity.
1 De Laval-Sturtevant, 360,000 c.ft. per hour capacity.

These work into a 30-in. main to the Brentford Works for redistribution; a 30-in. main supplying Southall, Ealing, and Hammersmith, and a 26-in supplying the Twickenham district. The governor house situated at the town end of the works' private road contains three Cowan governors, two being 24-in., controlling the Hammersmith and the Twickenham districts, and one, an 8-in., controlling the Southall supply. Two Fairweather calorimeters recording the quality of the supply on the Hammersmith and the Twickenham districts are also situated in the governor house.

SULPHATE OF AMMONIA WORKS.

This plant is of the closed saturator type comprising one Wilton still (capacity 10 tons per day), two closed saturators, and one neutralizing and drying tower. The exit gases from the saturator are passed through a Claus kiln, a lead chamber, three brick chambers, a lime tower, and two box purifiers. Power for the plant is supplied by two Lancashire boilers, 28 ft. by 7 ft., and 30 ft. by 8 ft. 3 in. The output is about 3000 tons of sulphate per annum—90 p.ct. being Grade 1a Neutral Quality, testing 21 p.ct. of nitrogen; the remainder being Ordinary Quality, averaging 20·8 p.ct. of nitrogen.

TAR AND PRODUCTS WORKS.

These works are situated at the south-west corner of the Company's area, and occupy about 9·7 acres.

The coal tar plant includes three 30-ton fire-heated intermittent stills installed by Messrs. Simon Carves, capable of dealing with 80,000 gallons of crude tar per week, when making road tars. During the winter months the crude tar is distilled down to pitch.

The oil gas tar plant consists of one 20-ton fire-heated still and two converted boilers, one steam and one fire heated. The capacity is approximately 100,000 gallons of Crude O. G. Tar per month; this crude tar having a water content of 50 p.ct., which is considerably reduced, by an arrangement of settling tanks, before going into the stills, the final water content being brought to an average of one-half per cent.

A crude benzole plant is in course of erection, and when completed will work in conjunction with the Whessoe washer.

The benzole rectification plant, erected by Messrs. Wilton's Chemical Engineering Company, comprises a washing unit of 4000 gallons capacity, together with four steam-heated stills, a crude still, and first and final rectifiers, which are each of 3400 gallons capacity. A smaller still is used for solvent naphtha production. When working continuously, this plant deals with 21,000 gallons of the crude oil per week. The power is supplied by three Lancashire boilers, each 30 ft. by 8 ft. 3 in.

Following the inspection, the visitors were entertained at tea by the Company.

WORKS IN TRANSITIONAL STATE.

The PRESIDENT remarked that Mr. Thorman was no stranger to the Association. He had given them an excellent lecture at one of their meetings held in the Westminster Technical Institute, and had taken a great deal of trouble that day to make their visit enjoyable. The Council of the Association were glad that their desire to visit the Southall Works had been carried into effect. The works were in a state of transition, and they had been able to see what was being done to bring the plant up to date and to increase its capacity. Mr. Thorman had told him that on certain days the increase in output had reached a figure of 30 p.ct.; and this showed the need for extensive enlargement of the plant. During the inspection he had been much impressed by the control room.

A VISIT OF GREAT INTEREST.

Mr. F. J. PEARCE, of the North Middlesex Gas Company (a past President of the Association), proposed a vote of thanks to the Directors of the Gas Light and Coke Company and to Mr. Thorman. Those present must have been struck with many interesting features of the works, the lay-out of which indicated what a great deal of care and thought had been expended. They had seen in operation a method of carbonization not frequently used—he referred to the inclined retorts—and they must have been most interested in the control room, the apparatus in which showed exactly what was happening in the retort house. The question of "safety first" had obviously been considered by those responsible, as was evidenced by the fact that the ladders were fitted with guards—a minor point, perhaps, but an important one. Another matter which he would mention was that all, or nearly all, the pipes in the works were carried overhead, which system was of great advantage. There was a neat and compact tar plant capable of dealing with all the tar produced on the works, and nearby was a fine benzole rectification plant. Then they had seen the excellent workshops, machine shops, and brass foundry. Altogether there had been plenty to interest them, and he was certain that all present were ready to give a hearty vote of thanks to the Gas Light and Coke Company, and to Mr. Thorman and his assistants.

ATTENTION TO DETAIL.

Mr. LEONARD LACEY, Senior Vice-President, in seconding the vote, remarked on the excellent working results of the water gas plant at the Southall Works. There was perhaps a tendency in some undertakings to give insufficient attention to water gas plant; but Mr. Thorman, who always went down to details, had brought his plant to a high state of efficiency. In this, and in the control room, they had good examples of his methods.

THE BECKTON OF THE BRENTFORD AREA.

Mr. THORMAN said that he took as a compliment the Association's desire to inspect the Southall Works. He had always taken a keen interest in the Association, who were well known for their enthusiasm. The works were large, and could be said to be the Beckton of the Brentford area—a district which was nearly as great as that of the Gas Light and Coke Company before the amalgamation, and one which on the western side, due to progress in housing schemes, was developing at a tremendous rate. Before the amalgamation, the Brentford Gas Company had thought of replacing the Southall Works by building a new station on a site near the Thames. Difficulties prevented this, however, and the final result was the amalgamation with the Gas Light and Coke Company. He only pointed this out because some might think that, for a works of that size, the various units of plant were small. The capacity of the works—17 million c.ft. a day—was certainly large. Since the beginning of the year, they had carried out no reconstruction work. They were simply preparing the way for extensions which were bound to come along. They had concentrated on detail—with what he thought were gratifying results. Inclines were becoming obsolete; but much capital had been spent on them, and it was necessary to get the best possible results. As for the horizontals, they were modern, and compared favourably with those in operation throughout the country. Saving of fuel—whether in connection with water gas plant, retort houses, or boilers—was not only an important, but a fascinating subject; and it was astonishing what could be done by attention to detail. The quality of the producer gas for the settings, for example, could easily be kept up to 20 p.ct. of CO_2, and it was not difficult to raise this figure to as high as 26 p.ct. They were very pleased with their control room, which rendered easy the control of the retort houses. Mr. Thorman said he thought it was advisable to have the plant attached to a works. In their plant they could deal with oil gas tar, which formerly was rather a nuisance. When markets were favourable, oil tar constituted a distinct asset to offset the working expenses of the carburetted water gas plants. Moreover, when there was a tar plant on the works, transport costs were eliminated, and much unnecessary trouble was done away with. They had an excellent benzole rectification plant. Shortly they would be extracting the crude spirit from the gas. Any loss in calorific value of the latter would be compensated for by increasing the quantity of oil carburetted.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

Opening of New Library.

A Meeting of the Association was held at Cardiff on Saturday, Nov. 6; and in the absence of Mr. C. Bateman, the chair was occupied by Mr. T. V. BLAKE, of Cardiff, Senior Vice-President. Those present included Mr. J. H. Canning (Engineer and Manager of the Newport Gas Company), Mr. R. J. Auckland (Secretary of the Cardiff Gas Light Company), Mr. W. Stanford (Secretary of the Newport Gas Company), and Mr. J. Mogford, of Cardiff.

In the absence of Mr. H. D. Madden (Engineer and Manager), who had an engagement to fulfil in London, Mr. Auckland extended a hearty welcome to the members and visitors, on behalf of the Directors and officers of the Cardiff Gas Company. Thanks for the welcome were recorded on the proposition of Mr. W. E. Crowley (Newport), seconded by Mr. C. Collins (Swansea).

This being the first meeting of the session to be held at Cardiff, it was made the occasion of the official opening of the new library. A splendid bookcase for this purpose, and accommodation for it, had been provided by the Directors of the Cardiff Company at their Bute Terrace Offices.

The CHAIRMAN, in calling upon Mr. J. H. Canning to perform the opening ceremony, referred to that gentleman's generous gift of books, and his great interest in the welfare of the Association.

Mr. CANNING (who was received with enthusiasm) directed his remarks to the present-day need of a full education, in which libraries played an important part. A love of books had been his all his life; and he could speak from personal experience of the profit to be derived from a library. Lord Bacon had stated that "reading maketh a full man, conference a ready man, and writing an exact man." His advice to all was to leave "trashy" books alone; to prepare a good list of books; and to undertake a course of reading at a pace that would afford proper mental digestion. In conference, they should learn to express themselves clearly and convincingly, and to develop finely the art of public speaking, in order that they might experience no difficulty in conveying to others their ideas formulated from their own course of reading. It was essential to be exact, as exactness was the foundation of science. He would advocate the copious taking of notes, and, rather than taking anything for granted, the testing of the results of their reading by practical experience. This was one of the best examples of theory and practice working hand in hand. He would advise them not to be afraid to come forward and contribute a paper based upon their reading and their practical experience. Some, perhaps, hesitated from fear of failure; but he could assure them that failures in the past had been many, and it was from failures they learned most. Although they were members of a scientific organization, this was not a reason why they should confine their reading to scientific publications. They should read also a good selection of English literature. He would recommend them, when putting thoughts into words, to use language that the simplest could understand, and to develop the ways and means of condensation, at the same time making their meaning clear and explicit. Finally, he would urge them to continue study for all time. All were students, from the earliest time to life's end; and there was always something to learn.

In declaring the library open, he expressed the hope that it would grow from year to year, and would be a source of usefulness as well as pleasure to all.

Upon the proposition of Mr. AUCKLAND, seconded by Mr. STANFORD, a vote of thanks was accorded Mr. Canning.

The donors of books and periodicals are: Mr. J. H. Canning (Newport, Mon.), Mr. W. Cranfield (Hinckley), Mr. Octavius Thomas (Pentre), Mr. J. Mogford (Cardiff), and Mr. T. A. Canning (Dewsbury).

A visit was then paid to the meter repair shop of the Company, after which the members and visitors were entertained at tea by the Directors and officers of the Company. On the proposition of the Chairman, seconded by Mr. G. H. HUGHES (Chepstow), a vote of thanks was passed to the Company for their kindness and hospitality, and the facilities afforded for the meeting.

In the evening a paper was read, of which the following is an abstract:

DRY METERS.

By B. C. PHILLIPS, of Hove.

[Abstracted.]

Having dealt with the origin and development of the dry meter, Mr. Phillips went on to consider the standard meter, which, he said, provides larger gas ways, better valve surfaces, greater capacities, more efficient stuffing boxes, and easier working. The finished article, as turned out to-day, is excellent. The new high-capacity meter, which lessens the chambers from six to five, is a marked improvement, as also is the gas fire meter, with its high capacity for small size, which has done a great deal to popularize gaseous heating.

DIAPHRAGMS.

Diaphragms play the most important part in the construction of meters. The bay type was popular for many years. Now, however, the skin is fastened to the rims by steel bands, instead of by hemp cord or wire, as was formerly the practice. In any case, the bay type of diaphragm is going out of general use.

There is the disc type, in which the skin is placed in a narrow flat tin ring, turned over, flattened down, and then soldered to a deep rim. Then there is the pan or dish type, of recent origin. This consists of a stamped pan of a suitable size, turned over on its top edge. The disc of skin is clamped to the outside of the pan by a steel band or a wire ring. One of the objections to banding is that there is no means of ascertaining whether screwing-up has been carried too far; and cutting of the skin often takes place.

There is also the type with a taper rim having a groove or recess at a suitable distance from the top edge. The leather disc is neatly stitched to a wire ring, which rests on the top edge of the rim; a wire split-ring being inserted into the recess of the rim. A special tool expands the wire ring until the ends are brought together, when it is pressed into the recess. The skin is gripped on both top and bottom of the recess, leaving a space which contains a quantity of dressing and acts as a lubricating cell. Thus the most important position of the skin —where the hingeing of the diaphragm takes place—is kept moist.

CHROMING PROCESS.

Persian sheep skin is used for the diaphragms, except for large meters, for which goat and calf skins can be employed. The skin is subjected to a chroming process, which toughens the fibres and renders them more supple, besides enabling them to absorb more dressing, and retain it for longer periods.

BREAKING POINT OF SKINS.

The breaking point of a skin is determined by the number of times it will fold or hinge when in use as a diaphragm. The following experiments were carried out on a machine designed for testing skins, which was geared to make 250 strokes per hour. Uniform skins were chosen.

No. 1 skin, with the grain on, was put through the test in the undressed state. It broke round the binding when the index reached 41,300. One disc was banded on the outside of a pan. Three splits occurred when the index reached 51,100. Another disc was fixed in the rim, with recess, by a wire ring. It broke on the seam of the rim when the index reached 71,900.

No. 2 skin was dressed with almond oil, and allowed to remain for 24 hours before being tested. The grain on the skin was used. The bay diaphragm broke when the index reached 63,500, the pan diaphragm at 64,700, and the recess rim at 96,900.

No. 3 skin was chrome buffed, equal in thickness to the other skins with the grain on, and was dressed with almond oil. The bay diaphragm broke when the index reached 95,500, the pan diaphragm at 117,200, and the recess rim at 154,800.

FUTURE DEVELOPMENT.

Mr. Phillips suggested improvements in meter design.

The number of chambers containing gas, he said, must be lessened, and an automatic valve or governor must be embodied in the meter on the inlet side, to relieve the meter of pressure strain when it is not working, and to allow only the amount of gas to pass through the meter, when it is working, to permit of complete combustion at the appliance.

The paper concluded by drawing attention to the following points:

Fix a dry meter level.

Do not leave the meter partially suspended by its connections.

Plug a meter at once when it is disconnected.

Blow gently through the inlet before fixing; but do not do this in a house.

With regard to prepayment meters, count all money in the presence of consumers.

A discussion followed, in which Messrs. J. Mogford, A. C. Prankard, R. T. Mills, G. H. Hughes, C. Collins, and J. Wilson took part; and on the proposition of Mr. B. J. BELL (Cardiff), seconded by Mr. C. B. FELTON (Newport), a vote of thanks was accorded Mr. Phillips for his paper.

Salermo Limited.—In the "JOURNAL" for Oct. 20, p. 166, we gave a brief description of the "Salermo" low-temperature carbonization system. A Company has been registered under the title of Salermo Limited, with a nominal capital of £75,000 in £1 shares. The members of the Company are limited to 50, and there is to be no public invitation to subscribe for shares or debentures. The Directors are: Sir William Alexander, Managing Director of Messrs. Charles Tennant & Co., Ltd., of Glasgow, Mr. A. T. de Monilpied (Secretary), Mr. D. Milne Watson, and M. Lucien Legrand.

SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).

The Second Meeting of the session was held in the Royal Technical College, Glasgow, on Saturday evening, Nov. 6, when Mr. JAMES GRAHAM (Kilmarnock), Vice-President, was in the chair. He announced that the President was making good progress, and hoped to be back at the meetings in a short time.

The SECRETARY intimated that, as the plant at Auchengeich Coke Ovens was not in operation, as a result of the coal dispute, the visit of the Association there on Nov. 20 had been postponed.

The CHAIRMAN called upon Mr. Thomas Gray, B.Sc., A.I.C., to read a paper on "Coke Oven Gas Supply." He said Mr. Gray was one of the young members who had come forward at the request of the Council; and he thanked him for his ready response.

COKE OVEN GAS SUPPLY.

By THOMAS GRAY, B.Sc., A.I.C.

[Extracted.]

The first part of Mr. Gray's paper is a general description of the plant at Auchengeich Coke Works, Chryston. The carbonizing units are in two sections; the older one consisting of a bench of thirty Otto waste-heat ovens, and the other of fourteen Wilputte regenerative ovens.

COAL CARBONIZED.

The dross supplied is a mixture of good coking coal and a medium coking coal. These coals are emptied at the washer in the required proportions, and afterwards tipped into a receiving hopper, where they are deviated to the ovens. Analyses of dross are as follows:

—	Feb., 1926.	March, 1926.	April, 1926.
	P.Ct.	P.Ct.	P.Ct.
Moisture	9·5	9·1	10·0
Volatile matter (dry basis) .	34·5	35 5	34·8
Ash ,, .	6·0	5·8	5·5

CONTROL OF COMBUSTION.

The outstanding merit of the regenerative system is the simplicity and effectiveness of the heating arrangement and control. The fuel gas is measured by an "Electroflo" meter (orifice plate). The air for the combustion of this gas, calculated from the analysis, is driven in at a pressure of approximately 2 in. water gauge by a fan, and is measured by an "Electroflo" meter (pitot tube). Each oven side wall is divided into 24 vertical flues (11 on the discharging side of the oven, and 13 on the ram side) and receives in half the flues at one time its heated air from a corresponding number of individual regenerators situated below the oven chamber, and its gas from a hollow gun brick or cornue situated horizontally below the vertical flues; each cornue communicating with half the side wall. The volume of air is accurately distributed to each set of regenerators on coke and pusher sides alternately by an accessible perforated air pipe which slides into the bottom of the regenerators. The gas is supplied alternately to each half wall through special fireclay nozzles, one at the bottom of each vertical flue, leading out of the cornue. A horizontal flue along the top of the vertical flues collects burnt products from each half wall, and distributes these down the vertical flues in the remaining half of the wall, thence through the regenerators and main flue to the stack. Thus these regenerators are heated-up ready for preheating the air used at the next half-hourly reversal of the process. Thus it will be seen that efficient combustion of the gas available for carbonization can be obtained. This is especially necessary where, as in our case, we are working to capacity. To obtain a million cubic feet every day of the year necessitates that the ovens and machinery be constantly at concert pitch. [The Auchengeich Coke Ovens supply this daily quantity to the Glasgow Corporation.] We cannot afford to "hang up" a few retorts, as is often done in a gas-works. The ovens are charged and discharged strictly to schedule.

DIFFICULTIES.

A fruitful source of trouble lies in the fact that the tar in the suction mains is of very thick pitchy consistency, and will not run. It must be pushed along the main, which operation means frequent pokering in the inspection holes. This pokering must be carefully and systematically done, to prevent excessive indrawing of air and the consequent lowering of the calorific value. One section of the suction main not fitted with poker holes had actually to be taken out to be cleared of pitch and tar, and proved to be absolutely blocked for a distance of 6 to 8 ft.—and this in a 20-in. main. During inspections of gas-works mains which I have made on excursions with the Association, I have been struck with the fluid nature of the tars deposited there, as compared with that in our works.

PURIFICATION.

Most of the difficulties, however, are concerned with the purification plant. Hurdle grids 4 ft. high were originally installed. However, in the light of later experience, these were removed, and a layer of oxide 2 ft. thick was placed on the flat grids. The first supply of oxide contained 40 to 50 p.ct. of moisture; but as we were asked to start the supply of gas just after this oxide was received, there was no other alternative but to put this material straight into the boxes. Need one be surprised, then, that in ten days the gas was showing foul on a three-minute H_2S test, and had to be cut off? No. 1 box was opened, and it was found that the oxide had dried out to approximately 20 p.ct. of moisture, leaving large "rat holes" in the centre and sides of the mass. A quantity of oxide was obtained locally, and the box carefully and completely refilled.

Soon after starting again, another difficulty presented itself. The gas was showing foul in the main and clean at the boxes. The supply had to be shut off again; and while the gas was being blown to atmosphere, tests were made of different settings of the Weck valve, but all to no purpose. The trouble lay apparently in the valve. There had been excessive snow and rain falls, flooding the site of the boxes. This ultimately proved to be the source of the trouble, and emphasized the need for careful drainage of a gas-works site. The drain pots to the valve were of the open-top type, with the sealing dip pipe entering at the foot. The result was that surface drainage covered over these pots and allowed water to pass back into the body of the valve, which water, rising to a height of 6 to 8 in., ultimately became impregnated with H_2S from the entering gas, and so fouled the gas leaving all the boxes. These open pots were replaced by the water-tight type with suction dip pipes for connection to a syphon pump; and this trouble was remedied.

IMPURITIES IN GAS.

As washed coal is used for carbonization, the original sulphur content of the gas is much below the average found in gas-works practice. Also, since we scrub the gas for benzole, a large percentage of CS_2, and possibly HCN, is removed in the benzole wash oil, so that the net result is that we have less sulphur to remove than most gas-works, and there are eliminated in greater part two of the causes of fouling of oxide—CS_2 and HCN. The H_2S content of the gas is approximately 300 grains per 100 c.ft. entering the purifiers.

TEMPERATURE OF GAS.

The removal of the benzole from the gas at 20° C., or 68° Fahr., presents another problem during the winter months. Leaving the scrubbers at 20° C., the gas has to travel along 100 yards of main buried in the ground, and so is further cooled. The gas has therefore to be reheated before entering the boxes. This is done more or less successfully by steam-jacketing the main where it is above ground. Since, however, the boxes are not fitted with steam coils, the effect of this is probably not felt beyond the first box.

CAPACITY OF BOXES.

This undoubtedly is the most prominent question in the purification problem. There are so many conflicting formulæ that it is sometimes difficult to balance between capital expenditure and sufficient purifying area. Perhaps a few examples will illustrate the point.

(1) *Steere's Formula.*

$$A = \frac{G - S}{3000\,(D - C)}$$

where

A = cross-sectional area in square feet of oxide bed in each box of a given set (25 ft. by 20 ft.), and
S = a predetermined factor based upon the H_2S content of the crude gas at the inlet of the purifiers = 500 for 300 grains per 100 c.ft., and
D = depth in feet of oxide in whole set of purifiers = 12, and
C = a factor depending upon number of boxes in the set (for 4 box series, C = 10).

According to this formula,

$$G = \frac{(25 \times 20) \times 3000 \times 22}{500}$$

$$= 66{,}000 \text{ c.ft. per hour.}$$

Our normal make is 42,000 c.ft. per hour.

(2) *Meade's Formula.*—According to Meade, an area of 0·5 sq.ft. per 1000 c.ft. of gas per day should be allowed for each box. Capacity of four 25 ft. by 20 ft. boxes would then be 1,000,000 c.ft. per day.

(3) Before the Irish Gas Managers' Association [see "JOURNAL" for Sept. 1, p. 478], Mr. H. Blakeley gave a series of figures based on the well-known rule of allowing a 15-minute time contact of the gas in the purifiers—namely, from the time of entering the first purifier until leaving the last purifier. He did not mention the quantity of oxide in the boxes, nor did he say that the gas should be in contact with the oxide itself for

15 minutes. If the volume of oxide is only half the volume of the boxes, then the time contact of the gas with the oxide is only 7½ minutes, not 15 minutes. However, according to his figure, for size of boxes, our capacity is 44,000 c.ft. per hour, or normal. There seems to be no doubt, then, that the boxes are of sufficient capacity, though there is no gainsaying the fact that we find it necessary to empty and refill a box once in six weeks or two months.

ROTATION OF BOXES.

The rotation adopted at the commencement of the supply was the forward rotation. The valves on the boxes were changed weekly, until, after running for some weeks, it was observed that each such change fouled the gas for some hours. On the assumption that in our particular case, or at least until the catch box was built, it would perhaps be better to try the backward rotation, this method was adopted. Suppose we consider starting-off in the rotation numbers 1, 2, 3, 4 boxes. Then, by forward rotation, we have Nos. 2, 3, 4, and 1 boxes, putting the foulest box last in the series, which, being acted upon by the oxygen for revivification, tends to throw for a time H_2S into the gas stream, and, as there is no catch box, into the main. But on backward rotation—*i.e.*, Nos. 4, 1, 2, and 3, we have the foulest box second in the series, and so the danger is lessened.

Against this advantage, however, we have the disadvantage that revivification is hampered by the presence of H_2S passing on from the first box (No. 4) to the foulest (No. 1). On bringing into the circuit the catch box (No. 5), we reverted again to the forward rotation; and during the short time it was in operation, we proved its worth. At the first change of rotation from Nos. 1, 2, 3, 4, and 5 (catch) to Nos. 2, 3, 4, 1, and 5 (catch) the gas showed foul leaving No. 1 for 24 hours, though clean leaving the third box (No. 4). It is intended to adhere to this rotation, using No. 5 box always as a catch. As regards the question of oxygen content of the gas for revivification, an analysis shows this to be sufficient for the purpose: CO_2 3·6, C_nH_m 2·8, O_2 0·6, CO 7·2, CH_4 32·0, H_2 44·4, and N_2 9·4 p.ct.

It must be borne in mind that, from the starting of the gas supply until within a few weeks of the commencement of the coal strike, only four boxes were available for purification. The fifth was built after starting, and only came into operation as stated. Besides functioning as a catch box, this provision should prove specially helpful during the emptying of a box, because the purification had to be attempted with three boxes only (which were more or less inadequate for this purpose), or, alternatively, the plant had to be shut down. If it were suspected that the gas might show foul within (say) 24 hours—and this can be fairly accurately foretold—then the following procedure was adopted on one or two occasions, with successful results. When running on three boxes, the fourth would be opened, the top layer of oxide (that above the top of the hurdles) would be removed, and a fresh layer put in on top. This was done on three boxes, and it was found that the fourth box could then be emptied and refilled without fear of the gas showing foul before the completion of the task.

CALORIFIC VALUE.

A vexed question among gas engineers is whether or not coke ovens can maintain a supply of gas of constant calorific value. No doubt in the light of recent experiences those conversant with the facts relating to the supply under discussion will say emphatically that they cannot, but I feel I must ask them to bear in mind the initial difficulties in starting-up any new plant, and the many and varied alterations, &c., necessary as experience is gained. I am of the opinion that a much larger holder would assist us greatly in keeping the C.V. steady at any desired figure between 480 and 500 B.Th.U. I would put the holder capacity at at least 250,000 c.ft., or 4 to 5 hours' output from the ovens. A holder of this size would greatly assist in mixing the gas coming off the series of ovens in their various stages of carbonization, and would give less fluctuation of the C.V. A self-recording calorimeter is installed, but has not yet been put to work. It was installed immediately prior to the stoppage, and was intended to afford us some comparison with a similar instrument at the Provan end of the main, and also to promote a spirit of co-operation with the officials there. The holder as installed at present is a comparatively small one, and only acts as a compensating vessel between the output from the ovens and the boosting plant, and merely regulates the supply, no matter whether the ovens are gassing quickly or slowly. However, due to the method of heating the ovens with a half-hourly reversal of the fuel gas flow, there are a few minutes at each half-hour when the exhausters are supplying the holder with all the available gas. The presence of the holder thus obviates the blowing of seals during each of these reversals. As a mixing device for blending high and low calorific value gas, this holder is of little use. I consider that a holder of the capacity indicated would be helpful both for maintaining the C.V. at a constant figure, and also for providing storage capacity over several hours in the event of breakdown of plant, and thus obviating shutting-down the gas supply almost immediately. I may say here that some eminent authorities maintain that a large holder involves needless expense, and is unnecessary. Some achieve uniformity of quality by installing double mains, with suitable adjustment connections between them whereby the beginning and tail end of the charges, which represent the worst gas, are cut out of the gas supply. Others state that this device is unnecessary, and from their own experience find that regular charging and discharging enable them to supply gas of uniform quality. Possibly, with the older type of oven and its much longer coking time, this additional apparatus may be necessary, but with the modern regenerative oven and regular charging and discharging, it certainly could be dispensed with. We have found this to be the case; but I still say that a holder would be helpful, and would save the coke oven manager many anxious moments wondering whether it would be more advisable to shut down at once or carry on in the hope that a delay in charging would be remedied quickly.

Discussion.

Mr. J. BOYLE (Greenock) thanked the author for bringing before the members a subject which was fresh, interesting, and instructive. The question of coke oven gas was worthy of further attention. He thought the loss of ammonia could be traced to the high temperatures, and agreed that a larger holder would help to mix the gas.

Mr. MACFARLANE (Dalmarnock) asked what was the yield of tar and gas per ton of coal carbonized. He also asked if the viscous nature of the tar was not accounted for by the powdered fuel used in the new ovens.

Mr. GRAY explained that, under both old and new systems, the fuel was wet to the extent of 10 p.ct. The yield of tar was 2·5 p.ct., and the average yield of gas about 13,000 c.ft.

Mr. JAMIESON (Helensburgh) was interested in the flushing of the mains with tar, and asked what was the prospective life of the silica compared with the fireclay.

Mr. DICKIE (Chryston) thought silica in coke ovens was a forward movement. There were only two pure silica ovens in Britain, one of which was at Auchengeich. The results had been good; and he had known of a case of a five years' run with scarcely a crack. Silica was adaptable, and of greater conductivity.

Mr. MACGOWAN asked Mr. Gray to give the analysis of the gas before and after benzole extraction, and also the sulphur content of the coal charged.

Mr. GRAY replied that the sulphur content of the coal was 1½ to 2 p.ct. unwashed, and 1 p.ct. washed, and of the coke 0·6 p.ct.

Mr. R. KEILLOR thought the high temperatures would bring pitch troubles. It was not advisable to work without a catch box; and he was of opinion that another such box would greatly help to remove the present trouble.

Mr. GRAY (Greenock) said the general question of coke oven supply was particularly interesting just now; and he thought that, to be at all successful, the coke ovens would require to be apart from the coal industry. There must be a guarantee of continuous supply. He noted from the paper that about 70 p.ct. of the gas was returned to the ovens for firing. This was fairly high. The ammonia going forward was excessive; and he asked where it was absorbed. Going forward to the purifiers, it might add to the trouble, and render revivification impossible. With regard to the maintaining of a constant calorific value, in most gas-works there was not much difficulty. A careful levelling-up of all charges should make variation almost impossible.

Mr. GRAY replied that only 55 p.ct. of the total gas generated was used as fuel for the ovens. Any ammonia left had to go to the benzole scrubbing plant, where most of it was absorbed.

After a number of other speakers had joined in the discussion, Mr. Gray was cordially thanked for his paper.

The Thomas Meter.

Mr. James Hall, of the Provan Gas-Works, in a recent paper before the Western District of the Scottish Juniors, mentioned that the Thomas meter was designed to measure gas saturated with water vapour, and that the presence of free water as fog would cause inaccuracy. The same point was emphasized by M. Françon in the discussion on a paper on the Thomas meter which he read at this year's meeting of the Société Technique de l'Industrie du Gaz en France; and he advises, if there is a danger of fog in the gas, the installation of a serpentine drier. The paper itself contained nothing new to readers of the "JOURNAL;" but the fact was again emphasized that the Thomas meter measures gas output on a direct reading without the necessity for any corrections. Its accuracy is comparable with that of volumetric machines, providing it is installed and adjusted to cope with the particular conditions existing; and it is very economical in space. Of course, said M. Françon, a Thomas instrument adjusted for accurate work on coal gas will not, for instance, give similarly good results if turned over to coke-oven gas, for widely differing specific heats are then involved. The facts of a case having been ascertained, the meter must be set to function within known limits of pressure, temperature, and calorific power.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Miners' Return to Work.

SIR,—In view of the probable early return to work in the coal-fields, it is extremely desirable that steps should be taken to prevent price increases. It should be realized that any excessive demand for coal in the immediate future would automatically mean price increase; and therefore it is recommended that members should limit their demands as much as possible, and avoid any attempt to amass surplus stock.

Regarding the price, it must be realized that during the pre-strike period the coal industry was subsidized; and it is known that some of this subsidy was reflected in the reduced prices which were ruling during that period. This may have to be taken into consideration when price terms are fixed for new contracts; but nevertheless every effort should be made to keep the increase (if any) on pre-strike contracts as small as possible.

MAX MUSPRATT,
President.

Federation of British Industries,
39, St. James's Street, S.W. 1,
Nov. 12, 1926.

PARLIAMENTARY INTELLIGENCE.

Electricity Supply Bill.

Parliament reassembled on Tuesday, Nov. 9; the Electricity Supply Bill mainly engaging the attention of the House during the week. Reference to the Bill is made in other parts of this week's issue.

HOUSE OF LORDS.

Special Orders.

Brighton and Hove Gas Order: Referred to the Special Orders Committee.

HOUSE OF COMMONS.

Gas Regulation Act.

A copy was presented of a draft of the Special Order proposed to be made by the Board of Trade on the application of the Brighton and Hove General Gas Company.

MISCELLANEOUS NEWS.

INCREASES IN THE PRICE OF GAS.

Consequent upon an increased expenditure of £4550 since May in respect of coal, the Alloa Town Council have been compelled to increase the price of gas by 5d. per 1000 c.ft., making the charge 4s. 3½d.

The Buckie Gas Light Company have given notice of a further increase of 5d. per 1000 c.ft. The new figures are 7s. 6d. for lighting; and 7s. 1d. for cooking, heating, and power.

At a meeting of the Burntisland Gas Committee, it was decided to increase the price by 1s. 5½d. per 1000 c.ft. This makes the charge 5s. 10d.

At Cupar a further increase of 5d. per 1000 c.ft. has taken place, making the price 5s. 10d. With the discount of 5s. still in force, the net price is 5s. 5d.

The Ellesmere Council have raised the price to 7s. 6d. per 1000 c.ft.

The price in Greenock is to be further increased by 6d. per 1000 c.ft. In August the charge was advanced by 4d.

The Hastings and St. Leonards Gas Company give notice that, as from the September readings of the meters, the price to all consumers throughout their district will be increased by 1½d. per therm. The current price (subject to the authorized addition in the out-districts) is thus 1s. 1d. per therm, which is equivalent to 4s. 11·8d. per 1000 c.ft., or 13 p.ct. increase.

The Kirkintilloch Town Council, on the recommendation of the Gas Committee, have increased the price by 1s. per 1000 c.ft. This makes the charge 3s. 9d. for ordinary consumers, 3s. 7d. for power users, and 3s. 10d. for prepayment consumers.

The Montrose Gas Company, Ltd., have increased the price to 6s. 6d. per 1000 c.ft.

The Oswestry Gas Company announce that the price of gas will be increased immediately from 5s. 5d. to 6s. 3d. per 1000 c.ft.

The price at Prestonpans has been increased by 10d. per 1000 c.ft.

The Radcliffe and Little Lever Gas Board announce an increase in charge by 9d. per 1000 c.ft., making a rise of 1s. 2d. within two months. The present loss is over £700 a week.

The Board of the Sheffield Gas Company have decided to increase the price from 3s. 1d. to 3s. 5d. per 1000 c.ft. The last increase was from 2s. 11d. to 3s. 1d., so that the total addition in cost since the beginning of the coal dispute is 6d. per 1000 c.ft. In an interview with the "Sheffield Telegraph," Mr. Ralph Halkett (the General Manager) said: "Last week we had a 19 p.ct. increase in the consumption of gas, compared with the corresponding week of last year; and the week before that there was an increase of 25 p.ct."

The South Suburban Gas Company have notified consumers that they are compelled to increase the price by 1·4d. per therm throughout their area of supply, from the middle of the present quarter. It is stated that, in order to maintain a full supply of gas during the period of the coal mining stoppage, it has been necessary to buy during the last few months more than 100,000 tons of foreign coal, at prices considerably higher than those paid for English coal.

The Solihull Gas Company have given notice that the price will be increased, as from the date of the reading of the meter for the September quarter, by 1d. a therm, making the charge 1s. a therm.

The Gas Committee of the West Bromwich Town Council have increased the price, from the September quarter, by 1d. per therm.

New Joint-Stock Company.—The Auchterarder Gas Light Company, Ltd., has been registered as a joint-stock company, with £5500 capital, in £1 shares.

Duns Gas Supply.—At a meeting of the Duns Town Council, it was unanimously agreed to take no further action towards the adoption of the Burgh Gas Supply (Scotland) Act. The proposal to acquire the gas-works, at present owned by a private company, which has engaged the attention of the Council for some time, is therefore abandoned.

GAS REGULATION ACT APPLICATIONS.

AMENDING ORDERS.

Deal and Walmer Gas Company.

To substitute for the existing standard price of 15d. per therm a standard price of 20d.; and in place of 14·4d., a price of 19·4d. per therm, until June 30, 1927.

Rushden and Higham Ferrers District Gas Company.

To substitute for the existing standard price of 13·4d. and 14·6d. per therm a standard price of 14·6d. and 15·8d. per therm, until June 30, 1927.

SPECIAL ORDERS.

Flint Gas and Water Company, Ltd.

For powers to increase the share capital by £12,500 and the borrowing powers to one-half the share capital, and to use additional land adjoining the existing gas-works.

Midhurst Gas Company, Ltd.

To substitute for the maximum price of 11d. per therm a maximum price of 24d. per therm, until Dec. 31, 1927; and to make provision whereby these prices may be revised by an Order by the Board of Trade on the application of the Company or the Local Authority, if at any time it is shown to the satisfaction of the Board of Trade that the costs of the production and supply of gas have substantially altered through circumstances beyond the control of the Company.

SECTION I.

Bradford Corporation.

The maximum prices now authorized in respect of the supply of gas by the undertakers, and the prices which they have asked the Board of Trade to substitute, are set out below:

—	Present Maximum Price per 1000 C.Ft.	Proposed Maximum Price per Therm.
	s. d.	s. d.
For supplies within the city (other than through prepayment meters) . . .	4 0	1 2
For supplies in the urban district of Spenborough	4 10	1 4
For supplies in the urban districts of Clayton and Bingley.	4 8	1 3·6

It is also proposed that an additional charge per therm—namely, 1s. 4d.—should be authorized in respect of gas supplied through a prepayment meter.

DECLARATION OF CALORIFIC VALUE.

Seaford Gas Company, Ltd.—500 B.Th.U. (Dec. 1.)

British Engineering Standards Association.—At the annual general meeting of the Association, Sir Archibald Denny (the Chairman) reported that while the general work was in a most healthy condition, the finances, he regretted to say, were not. It could not, of course, be expected that this industrial work would be unaffected by such a devastating cessation of activity as the coal strike; and the Association had done its utmost to introduce still further economies, in addition to taking precautions for the immediate future. On March 31 last the Association had to face a total deficit of just over £2500. This implied that, for the time being, at any rate, they could not give effect to the expansion which should, and would, naturally take place, if the necessary funds had been at their disposal. With the help, however, of the Ways and Means Committee, the needs of the Association were being more prominently and more systematically brought to the notice of the many firms, public supply authorities, and others, who did not as yet subscribe to this national work.

WANDSWORTH COMPANY'S TESTING APPEAL.

Sir Richard Glazebrook (Chief Gas Examiner) has allowed the appeals of the Wandsworth, Wimbledon, and Epsom District Gas Company in respect of each of the three reports complained of, and has accordingly annulled the reports of July 27, July 30, and Aug. 2 which were the subject of the appeal reported in our columns of Oct. 6, p. 46.

L.C.C. HORNSEY RISE ESTATE.

Supply of Gas and Electricity.

The Housing Committee of the London County Council have had under consideration the question of the means to be adopted for lighting and cooking in the dwellings, comprising 188 tenements, in course of erection on Hornsey Rise Estate; and negotiations have taken place with the Gas Company and the Electricity Authority concerned.

The Gas Light and Coke Company are prepared to instal a gas supply with a cooking stove in each tenement, subject to payment by the Council of £1 a tenement, provided that the Company are free to fix one lighting point in the scullery or kitchenette. The gas would be supplied through prepayment meters at the current price for the district in such cases. As to electricity, the Islington Borough Council are not desirous of undertaking the wiring of the tenements, but are prepared to supply electricity in bulk, leaving it to the Council to arrange for the distribution of the current and the collection of the money through prepayment meters. The price of the current in bulk would be at the rate of 3d. a unit, *plus* the percentage increase or decrease made by the Borough Council from time to time. At present an increase of 25 p.ct. is in force. The cost of the installation (including the prepayment meters) is estimated not to exceed £3000; and, in order to meet the capital charges on this sum, together with the cost of the energy in bulk and of distribution and maintenance, it will be necessary, with the bulk supply at its present rate of 3⅜d. a unit, to make a charge to the tenants of 8½d. a unit, which would be subject to fluctuation in accordance with any future increase or decrease made by the Borough Council in the bulk rate. An additional sum not exceeding £220 will be required for wiring the common staircases.

The Committee propose to accept the offers of the Islington Borough Council and the Gas Light and Coke Company, and that electricity be employed for general lighting purposes, with gas for cooking and heating and for ancillary lighting for the use of the tenants if desired.

Cardiff Publicity Club.—Mr. H. D. Madden has been elected President of the Publicity Club of Cardiff for the ensuing year. The session opened with a luncheon meeting at the Royal Hotel, when the Lord Mayor (Alderman W. B. Francis) occupied the chair, and the new President delivered an address upon "The Advantages of Publicity."

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 15.

There is no change to report in the London tar products market, and values generally remain at the figures last published.

Tar Products in the Provinces.

Nov. 15.

The average values of gas-works products during the week were: Gas-works tar, 121s. to 126s. Pitch, East Coast, 195s. to 197s. 6d. f.o.b. West Coast—Manchester, 187s. 6d. to 190s.; Liverpool, 190s. to 193s.; Clyde, 193s. 6d. to 195s. 6d. Benzole, 90 p.ct., North, 1s. 11d. to 2s.; crude, 65 p.ct. at 120° C., 1s. 4d. to 1s. 5d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 11d. to 2s. Toluole, naked, North, 1s. 11d. to 2s. nominal. Coal-tar crude naphtha, in bulk, 9d. to 9½d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 1d. to 1s. 2d. Creosote, in bulk, North, liquid, 8½d. to 9d.; salty, 8d. to 8½d.; Scotland, 7¾d. to 8¼d. Heavy oils, in bulk, North, 7¼d. to 7¾d. Carbolic acid, 60 p.ct., 1s. 5d. to 1s. 6d. prompt. Naphthalene, £11 to £14; salts, 90s. to 100s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

TRADE NOTES.

"'Twixt Hook and Load."

We have received from Messrs. Herbert Morris, Ltd., of Loughborough, a booklet having the above title. It is a remarkable fact, they say, that most people take a great deal of trouble to obtain dependable lifting machinery, but, having obtained this, they overlook the fact that the safety of their workmen and their goods depends just as much upon the "sling" as it does upon the lifting gear itself. The booklet is designed to emphasize this important point.

EXTENSIONS.

New Holder for Helston.

It was reported by the Chairman of the Gas Committee at a meeting of the Helston Town Council that the storage at the works at the present time was inadequate, and that if a new holder was installed a saving of £100 per annum in the cost of coal would be effected, and the production of gas improved. The Committee recommended that steps be taken to obtain estimates from various firms for the installation of a new holder during the coming spring; and the necessary sanction was given by the Council. It was stated that the approximate cost of a new holder would be £3000.

The Uttoxeter Urban District Council have decided to express their appreciation to the Uttoxeter Gas Company for the way the Company have lighted the town during the coal crisis.

THE COKE QUEUE AT THE GATES.

From Mr. A. E. Ruffhead, Assoc.M.Inst.C.E., the Engineer and Manager of the Darlington Corporation Gas-Works, we have received an interesting photograph, here reproduced by the courteous permission of the Editor of the "Northern Echo," Darlington. It shows a queue waiting for coke at the Albert Road gates of the Darlington Gas-Works. It is the practice to open the gates on Friday and Saturday mornings only, when over 5000 ½-cwt. tickets are usually sold. The Darlington "Evening Dispatch" of Oct. 29 had the following notice of the uncommon spectacle:

Coke was in great demand at the Darlington Gas-Works to-day. A notice had been issued that half-hundredweights would be available for distribution at 7.30 a.m.; and the first members of a queue arrived at four o'clock. By seven o'clock hundreds of people with old-fashioned perambulators, handcarts, and bicycles had assembled in the hope of securing a supply. Every few days the Corporation are in a position to supply a certain quantity of coke, and on each occasion hundreds queue at the entrances to the gas-works in Albert Road and John Street. During the long wait this morning a woman brought a can of tea to sustain her friends, who had been waiting for three hours.

QUEUE WAITING FOR COKE AT THE GATES OF THE DARLINGTON GAS-WORKS.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Inquiries are circulating freely for coal deliveries after the strike; but business is difficult to arrange. Many fitters now decline to quote for the first few months after the resumption of work, preferring to wait and see how things shape, and being confident of good markets. On the other hand, buyers are inclined to hold off for the longer periods, such as twelve months, for which collieries indicate prices in the neighbourhood of 20s. f.o.b.

Local coal production is increasing, and, while there is still no surplus available for shipment, it indicates that many pits will be in condition to go quickly into full production when a final settlement is arrived at.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

A fair quantity of American gas coal is now being discharged in the Humber, and this has removed the anxiety felt at some of the works where supplies were running short. Boisterous weather in the Atlantic has been responsible for considerable delay in the arrival of cargoes.

With deliveries more available from English sources, it appears that, with an early settlement of the dispute in view, further anxiety may be avoided.

Prices for imported gas coals have advanced owing to increased freightage; but a steadier trend is now apparent.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

The squeeze in gas coal is reaching an acute stage. Engineers who have been lured by the prospect of liberation from the foreign yoke into allowing their margin of safety to become slender are in an anxious predicament. Supplies from home sources have been steadily improving, but not in proportion to the cutting down of purchases from abroad. Quite apart from questions of cost, buyers who are re-entering the market find that there are formidable difficulties in the way of getting reinforcements from America. Grain is competing for tonnage, and stormy weather is reducing the effective capacity of ocean transport. Westphalian coal, which proved a serviceable resource a few months ago, was brought into such discredit by inattention to quality that it is taboo in many quarters.

American coal now costs round about £5 a ton delivered in the Midlands. Home prices have ranged from £2 10s. to £3 at the pithead. There is a difference of opinion as to the position of gas coal in relation to the arrangement lately concluded for price limitation. While some collieries apply the restriction to their sales to gas undertakings, others claim that their hands are untied in this department of the trade.

The new rationing scale would involve more disturbance than has in fact resulted if it were rigidly carried out. In the view of many distributors it is so manifestly unworkable as an exact system that some latitude is allowable. The stringency in industrial fuel is not perceptibly relieved. A sharp rise in Continental coke has added materially to the burdens of foundrymen, who now have to pay from £4 10s. to £5 for supplies in this district.

Water on Weighbridges.

The Sheffied Gas Company were fined 50s. in each of two cases at the local Police Court last week for using for trade on Sept. 2 a 10-ton weighbridge which was 56 lbs. unjust, and another 20-ton machine which was 84 lbs. out. Mr. G. H. Banwell, for the prosecution, stated that the weighbridges were at the Neepsend Works of the Company. It was not suggested that there was anything mechanically wrong with the weighbridges, but there was a screw which should be adjusted from time to time to deal with such matters as water or mud on the weighbridges, as weather conditions could make an appreciable difference. An inspector of weights and measures said that, apart from the question of adjustment, the weighbridges were in good working condition. He thought the screw should be adjusted at least every half-day. Mr. W. F. Scorah, for the defence, said that the Company paid a substantial amount for periodical tests of the machines, and had a competent weigh clerk. Mr. William Whaley, the weigh clerk, said he balanced the machine two or three hours before the inspector's visit. There were many vehicles over the bridge that day. It was fine when he adjusted the bridges, and it rained afterwards.

Haslemere Debenture Stock Issue.—The tenders for the £9440 of 5½ p.ct. perpetual debenture stock which Messrs. A. & W. Richards offered on behalf of the Directors of the Haslemere and District Gas Company ranged from £99 down to the minimum of £95 per £100.

Further Vertical Retorts for Hinckley.—Mr. F. Gregson Williams held an inquiry at Hinckley last week, with regard to an application by the Urban District Council to borrow £24,649 for the construction of additional vertical retorts at their gas-works. It was explained by Mr. F. Lee (the Gas Manager) that it was proposed to supply the villages of Barwell and Earl Shilton with gas, though this had not been taken into consideration in connection with the present proposals. Owing to the increasing demand for gas, and with a desire to ensure a satisfactory industrial supply, it was proposed to erect twelve 5-ton vertical retorts. The existing retorts were built to produce 750,000 c.ft. a day; and this quantity had been exceeded on many days during last winter. Since 1921 the gas made had increased from 134 million c.ft. to 176 millions. The new plant will be erected on the site of the old retort house.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Nov. 10.]

Nos. 27,254—27,969.

ALDRIDGE, F. D.—"Apparatus for manufacture of coal gas." No. 27,308.

COCHRANE, A. K.—"Prepayment gas meter." No. 27,384.

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Recently John Sharp, of Burley-in-Wharfedale, died from gas poisoning, and his wife had a narrow escape. They went to sleep in an unventilated room—the window was closed and there was no flue—and left a gas heater burning by their bedside. Next morning both were found unconscious; and the following day the man, who was 75 years old, died.

At a recent meeting of the Evesham Council, Councillor Gill Smith, in presenting the minutes of the Gas Committee, said that at the beginning of the coal strike they had three months' stock of coal. After this was consumed, they had to obtain, at a far greater price, coal from Germany and America. As a result, they had to increase the price of gas to 5s. 11d. per 1000 c.ft. They had sufficient stock of coal to last till Christmas. In spite of competition from electricity, they had sold 250,000 c.ft. more gas in Evesham during October than during the corresponding month last year.

The Gas Committee at Bridgnorth reported to the Town Council last week that the make of gas during the quarter ended Sept. 21 was 7,316,000 c.ft., an increase of 688,000 c.ft. on the corresponding quarter of last year. The quantity of gas sold was 6,408,200 c.ft. Councillor Edge considered the report disquieting, and hoped the Committee would go into the matter. The fact that 907,000 c.ft. was unaccounted for was serious. It looked as if 13 p.ct. of the make was lost in leakage. If they made the liberal allowance of 6½ p.ct., the extra loss to the Department meant £6 a week. The question of whether the gas-works was a paying concern arose. The ex-Mayor said the Committee would go thoroughly into the matter.

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STOCK MARKET REPORT.

At the close of last week, in spite of the reported "further break" in the negotiations between the Government, the mine owners, and the miners, the Stock Exchange had evidently made up its mind that the long struggle was really coming to an end. Buyers were still cautious, but prices were buoyant, particu- those of Investment stocks. It was realized, however, that the settlement would not bring about an immediate increase of profit, and Industrials, with the exception of Iron, Coal, and Steel shares, were not eagerly sought after. The announcement of the Miners' Federation decision to accept, subject to the approval of the districts, the Government's proposals confirmed the optimistic views.

There were no outstanding features in any of the markets, and there were no new issues of importance.

The Gas Market is showing signs of revival. More prominence is being given to the stocks in the various financial articles, particularly the Gas Light Company and the South Metropolitan Company ordinary stocks. While it is obvious that the high prices being paid for foreign coal will affect the results for the year, it must be remembered that the protection given to stockholders by the minimum dividend powers of both these companies, and, in the case of other companies by the temporary increase in the standard prices, should ensure a satisfactory dividend distribution. It will be noticed from the table, however, that the quotations, with the exception of the North Middlesex ordinary, do not reflect this increased interest.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr	Dividends. Last Hf. Yr.	NAME.	Quotations. Nov. 12.	Rise or Fall on week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 12	5	5	Aldershot 5 p.c. max. C.	72—75	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	65—70	..	..
1,551,868	,,	Sept. 30	6½	6½	Alliance & Dublin Ord.	83—88	..	..
374,000	,,	July 8	4	4	Do. 4 p.c. Deb.	67—70	..	..
800,000	1	Oct. 14	1/7½	1/7½	Bombay, Ltd.	1—1½	..	20/6—21/-
170,000	10	Aug. 26	8½	8½	Bournemouth 5 p.c.	12—13	..	12½—12⅝
500,050	10	,,	7	7	Do. B 7 p.c.	12—13	..	12⅝—12¾
275,000	10	,,	6	6	Do. Pref. 6 p.c.	11—12	..	11
50,000	Stk.	June 24	3	3	Do. 3 p.c. Deb.	54—57	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	74—77	..	..
214,740	,,	Aug. 26	12	12	Brighton & Hove Orig.	163—168	..	..
244,200	,,	,,	9	9	Do. A Ord.	125—130	..	..
1,287,500	,,	July 22	5	5	Bristol 5 p.c. max.	85½—86½*a*	−1	
855,000	,,	Sept. 30	7	8	British Ord.	102—107	..	104½
100,000	,,	June 24	7	7	Do. 7 p.c. Pref.	114—119	..	118½
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	68—73	..	..
100,000	10	June 10	6	8	Cape Town, Ltd.	7—8	..	7⅞—8
100,000	10	Oct. 28	4½	4½	Do. 4½ p.c. Pref.	6—7	..	..
150,000	Stk.	June 24	4½	4½	Do. 4½ p.c. Deb.	68—73	..	..
626,860	,,	July 22	6	6	Cardiff Con. Ord.	94—97	..	..
237,860	,,	June 24	7½	7½	Do. 7½ p.c. Red. Deb.	99—102	..	..
157,150	,,	Aug. 12	6½	5	Chester 5 p.c. Ord.	88—93*b*	..	..
79,185	1	Sept. 30	†2/-	†2/-	Colombo Ltd. Ord.	27/—29/-	..	..
24,495	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	20/—22/-	..	..
1,513,280	Stk.	Aug. 12	5½	5½	Commercial 4 p.c. Cap.	77—80	..	77—78½
560,000	,,	,,	5/3/4	5/3/4	Do. 3½ p.c. Cap.	74—77	..	75¼
475,000	,,	June 24	3	3	Do 3 p.c. Deb.	55—58	..	..
800,000	,,	Sept. 30	§2	§1	Continental Union, Ltd.	27—32	..	29—30
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	82—85	..	..
737,150	,,	Aug. 12	6½	6½	Croydon sliding scale	96—99	..	..
403,100	,,	,,	5	5	Do. max. div.	78—81	..	..
492,270	,,	Aug. 26	9	6	Derby Con.	107—109*e*	..	..
55,000	,,	June 24	4	4	Do. Deb.	73—75*e*	..	..
209,000	,,	Sept. 16	5	5	East Hull Ord. 5 p.c.	84—87	..	..
50,000	,,	June 24	5	5	Eastbourne 5 p.c. Deb.	91—96	..	..
1,002,180	10	Sept. 30	†4	†3	European, Ltd.	6⅞—7⅛	..	7—7⅛
18,788,960	Stk.	Aug. 12	4/17/4	5/1/4	Gas Light & Coke 4 p.c. Ord.	85—85	−½	82⅝—84½
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	58—61	½	59⅛—59⅜
4,157,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	74—77	..	75¾—76¾
5,602,620	,,	June 24	3	3	Do. 3 p.c. Con. Deb.	58—61	..	58⅜—59⅛
181,315	,,	,,	—	—	Do. 6 p.c. Br'tf'd Rd. Db.	100—105	..	..
130,000	,,	—	10	10	Do. 10 p.c. Bonds.	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	102½
82,500	,,	Aug. 26	6⅔	6⅔	Hastings & St L. 5 p.c. Conv	87—92	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	66—71	..	69
70,000	10	Oct. 14	†10	†10	Hongkong & China, Ltd.	19—20	..	..
173,200	Stk.	Sept. 16	5	5	Hornsey Con. 3½ p.c.	69—71	..	..
1,976,000	,,	Nov. 11	†10	10	Imperial Continental Cap.	128—133*	−4	130—135
226,170	,,	Aug. 12	3½	3½	Do. 3½ p.c. Red. Deb.	68—71	..	..
235,242	,,	Aug. 12	6½	6½	Lea Bridge 5 p.c. Ord.	92—97	..	..
2,127,340	,,	Aug. 12	5½	5½	Liverpool 5 p.c. Ord.	80—81*b*	..	..
600,000	,,	Sept. 30	7	7	Do. 7 p.c. Red. Pref.	102—105*b*	..	..
165,736	,,	Aug. 26	8	9	Maidstone 5 p.c. Cap.	112—117	..	..
63,480	,,	June 24	3	3	Do. 3 p.c. Deb.	53—58	..	..
75,000	5	June 24	†6	†7	Malta & Mediterranean	5½—6⅝	..	..
541,920	Stk.	May 20	†4	†6	Montevideo, Ltd.	80—83	..	..
2,061,315	,,	Aug. 12	5	5	Newcastle & Gateshead Con.	71—71½*d*	+½	..
360,929	,,	,,	4	4	Do. 4 p.c. Pref.	73—74*d*	..	..
529,705	,,	June 24	3½	3½	Do. 3½ p.c. Deb.	68½—69*d*	+⅜	..
15,000	,,	Aug. 26	11¼	11¼	North Middlesex 10 p.c.	155—160	+4	157—159
91,530	,,	,,	8⅗	8⅗	Do. 7 p.c.	109—114	..	110
300,000	,,	May 6	9	7	Oriental, Ltd.	97—102	..	..
188,120	,,	June 24	7⅞	7⅞	Plym'th & Ston'house 5 p.c.	108—113	..	..
414,500	,,	Aug. 26	—	7/4/6	Portsm'th Con. Stk. 4 p.c. Std.	102—107	..	..
236,732	,,	,,	—	5/0/0	Do. 5 p.c. max.	78—81	..	..
2,389,909	1	—	—	—	Primitiva Ord.	12/6—13/6	−/3	12/7½—13/3
382,200	100	June 1	4	4	Do. 4 p.c. Red. Deb.	84—86	..	85—86
600,000	Stk.	July 22	4	4	Do. 4 p.c. Red. Deb. 1911	69—71	..	..
180,306	,,	June 24	4	4	Do. B. Aires 4 p.c. Rd. Db.	..	..	..
366,847	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	..	..	..
150,000	10	Sept. 30	6	6	San Paulo 6 p.c. Pref.	7⅛—8	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	46—49	..	..
270,000	Stk.	Sept. 16	6	5⅔	Sheffield A	97—99*e*	..	..
419,968	,,	,,	6	5⅔	Do. B	97—99*e*	..	..
1,047,000	,,	,,	6	5⅔	Do. C	97—99*e*	..	..
90,000	10	June 11	4	—	South African	5—7	..	..
6,699,895	Stk.	Aug. 12	7	5	South Met. Ord.	90½—92½	..	91—92
1,895,445	,,	July 8	3	3	Do. 3 p.c. Deb.	57—60	..	58½
734,000	,,	Sept. 16	6½	6½	Do. 6½ p.c. Red. Db.	100—102	..	..
91,500	,,	Aug. 12	8½	8½	South Shields Con.	114—116*d*	..	..
1,187,795	,,	Aug. 12	6½	6½	South Suburban Ord. 5 p.c.	96—99	..	..
368,837	,,	June 24	5	5	Do. 5 p.c. Deb.	92—95	..	93¼—94½
647,740	,,	Oct. 14	5	5	South'mpton Ord. 5 p.c. max.	75—78	..	77
121,275	,,	June 24	4	4	Do. 4 p.c. Deb.	68—73	..	70½
250,000	,,	Aug. 26	7	7	Swansea 7 p.c. Red. Pref.	100—102	..	..
200,000	,,	June 24	6½	6½	Do. 6½ p.c. Red. Deb.	100—102	..	..
120,000	,,	July 22	7⅛	7⅛	Tottenham District A 5 p.c.	105—110	..	..
883,275	,,	,,	5½	6½	Do. B 3½ p.c.	88—91	..	90½—91
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref.	99—101	..	..
181,255	,,	June 10	4	4	Do. 4 p.c. Deb.	73—76	..	..
258,251	,,	Aug. 26	5	5	Tynemouth Con. and New Uxbridge, Maidenhead, & Wycombe 5 p.c.	67—68*d*	..	..
197,294	,,	Aug. 26	6⅝	6½	Do. 5 p.c. pref.	85—90	..	..
88,330	,,	,,	5	5	Do. 5 p.c. Maidenh'd	80—85	..	84
91,800	,,	,,	6⅝	6½	Wandsworth, Wimbledon, and Epsom—	85—90	..	..
30,000	,,	July 8	8½	8½	Wandsworth A 5 p.c.	122—127	..	..
255,636	,,	,,	7	7	Do. B 3½ p.c.	102—107	..	..
412,450	,,	,,	5/19/0	5/19/0	Do. C and New	88—93	..	..
352,000	,,	,,	6⅝	6⅝	Wimbledon 5 p.c.	98—103	..	..
98,000	,,	,,	7⅛	7⅛	Epsom 5 p.c.	104—109	..	..
88,416	,,	June 24	3	3	3 p.c. Deb.	54—57	..	..

Quotations at :—*a.*—Bristol, *b.*—Liverpool, *c.*—Nottingham, *d.*—Newcastle, *e.*—Sheffield. *Ex. div. † Paid free of income-tax. ‡ Plus 8½ p.c. p.a. special dividend. § For year.

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The following transactions were recorded during the week:

On Monday, Bournemouth 12¾, Bristol 5 p.c. maximum 84½, Cape Town 8, European 7 1/16, Gas Light and Coke 83, 83¼, 83⅜, 84, 84⅛, 84¼, 3½ p.c. maximum 59¾, 4 p.c. preference 75½, 3 p.c. debenture 58¾, 59, Imperial Continental 134, Primitiva 12s. 9d., 12s. 10½d., 13s., 13s. 1½d., South Metropolitan 91, 91½, 92¼, South Suburban 5 p.c. debenture 93½, Southampton 5 p.c. maximum 77, 4 p.c. debenture 70½, Uxbridge 5 p.c. preference 84. Supplementary prices, Colonial 24s. 3d., Gas Light and Coke 5 p.c. debenture (interest from July 8, 1926) 100¾, 101, 101¼, (interest from Sept. 1, 1926) 100, Hong Kong and China 5 p.c. debentures 80½, Liverpool 5 p.c. 80, 80½, Southend-on-Sea 5 p.c. new 81, 81½.

On Tuesday, British 7 p.c. preference 118½, Commercial 3½ p.c. 75⅝, European 7⅛, Gas Light and Coke 83, 83⅛, 83½, 83⅝, 83¾, 4 p.c. preference 76½, 3 p.c. debenture 58⅝, Hastings 3½ p.c. 69, North Middlesex 10 p.c. 58, 59, Primitiva 12s. 7½d., 12s. 10½d., South Suburban 5 p.c. debenture 93½. Supplementary prices, Holyhead and North Wales 6s. 6d., Lea Bridge 5 p.c. preference 91, Liverpool 5 p.c. 80, 80½.

On Wednesday, Bombay 20s. 6d., Bournemouth 7 p.c. maximum 12⅝, 12¾, British 104½, Commercial 77, Continental Union 29, European 7, Gas Light and Coke 82¾, 83, 83½, 83⅝, 83¾, 3½ p.c. 59 11/16, 59¾, 3 p.c. debenture 59½, Imperial Continental 134, 135, Newcastle 3½ p.c. 70⅜, Primitiva 12s. 10½d., 13s., 13s. 1½d., South Metropolitan 91½, 91⅝, 92, South Suburban 5 p.c. debenture 94½, Tottenham "B" 90¼, 91, Tuscan 6 p.c. debenture 66. Supplementary prices, Cheltenham 5 p.c. 74, Chester 5 p.c. 89¾, Gas Light and Coke 5 p.c. debenture (interest from July 8, 1926) 101, Swansea 5 p.c. 81¾.

On Thursday, Bournemouth "B" 12¼, 6 p.c. preference 11, Commercial 4 p.c. 78¼, Gas Light and Coke 82⅝, 82⅞, 83, 83¼, 83½, 83⅝, Imperial Continental 130, 131, 131½ *ex* div., North Middlesex 10 p.c. 157, 7 p.c. 110, Primitiva 13s., South Metropolitan 91, 92, 3 p.c. debenture 58½. Supplementary prices, Hastings 3½ p.c. debenture 63.

On Friday, Bombay 20s. 6d., 21s., Cape Town 7⅞, Continental Union 30, Gas Light and Coke 83½, 83⅞, 84, 3½ p.c. 59¾, 3 p.c. debenture 58½, Primitiva 12s. 10½d., 13s. 1½d., 13s. 3d., 4 p.c. debentures 85, 86, South Metropolitan 91¼, 91½, 91⅞, 92. Supplementary prices, Brentwood 10 p.c. 102, Gas Light and Coke 5 p.c. debenture (interest from July 8, 1926) 101½, 7⅛ p.c. Ilford debenture 102½, Reading 5 p.c. 86½.

In the Money Market the usual "end of the week" ease was in evidence. The clearing banks charged 4 p.c. for renewals; other lenders charging 3¾ p.c. Fresh money was obtainable late in the day on Friday at 3½ p.c. The average rate of allotment of Treasury Bills which has been steadily rising for many months reacted at last, and fell about 1s. 1d., to £4 16s. 6·74d. p.c.

Foreign Exchange movements were largely due to the developments in the coal dispute. Sterling was firmer, and closed with a rise of 7/32 at 4.85 3/16. Francs also improved substantially, and, after touching 144, closed at 146⅛. The Belgian rate was 34.84½; and Italian lire were dearer at 117⅞.

Bar Silver, notwithstanding Chinese sales, improved 1/16d. to 25 7/16d. per oz.; but Gold remained unchanged at 84s. 11½d. per oz.

The Bank Rate is 5 p.c., to which it was raised from 4 p.c. on Dec. 3. Bankers' deposit rates are 3 p.c. The deposit rates of the discount houses are 3 p.c. at call and 3¼ p.c. at notice.

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Tins for Sale to Consumers.
In Bulk for Works Use.
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FOR Motor Lorries and Railway Traffic can be seen erected at our works READY FOR DELIVERY. Inspection by your Engineer invited and a test by your Local Inspector of Weights and Measures before delivery. Every machine a High-Class Engineering Product and fully guaranteed.
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CITY OF COVENTRY.
(CORPORATION GAS DEPARTMENT.)

DISTRIBUTION Engineer and Mains SUPERINTENDENT Wanted to Take Control of the Mains Department.

Applicants must be thoroughly Qualified, and have had Practical Experience in the Planning and Carrying Out of both High and Low Pressure Schemes of Distribution. Must be a Good Organizer. Commencing Salary, £400 per Annum.

Apply, stating Age, Experience, with *copies* of Three Testimonials, to the undersigned on or before the 25th of November, 1926.

P. N. LANGFORD,
Engineer and General Manager.

CITY OF LEEDS.
(GAS DEPARTMENT.)

THE Gas Committee invite Applications for the Position of ASSISTANT MANAGER of their Meadow Lane Works.

Applicants must have had Experience with up-to-date Gas-Works Plant, including Vertical Retorts and Carburetted Water Gas.

Salary £325 per Annum.

Applications, stating Experience and Age, together with *copies* of not more than three recent Testimonials, must be sent on or before Monday, the 22nd of November, 1926, to the undersigned.

C. S. SHAPLEY,
Engineer and General Manager.

Gas Offices,
Market Hall,
Leeds.

RHYL URBAN DISTRICT COUNCIL.
GAS AND WATER ENGINEER.

THE Council invite Applications for the Position of GAS and WATER ENGINEER and MANAGER.

Applicants must be Fully Qualified and have had Practical Experience in all Branches of these undertakings, and capable of Designing and Carrying out any Extensions on either or both undertakings that may at any time be required.

Salary, £400 per Annum.

Applications, stating Age, full Details of Qualifications, Certificates held (if any), present appointment and date when Duties can be taken up, together with *copies* of not more than Three recent Testimonials, to be sent to the undersigned, endorsed "Engineer," by not later than the 4th of December, 1926.

T. AMOS JONES,
Clerk to the Council.

Council Offices,
Rhyl.